PROCEEDINGS

Eightieth Annual Convention

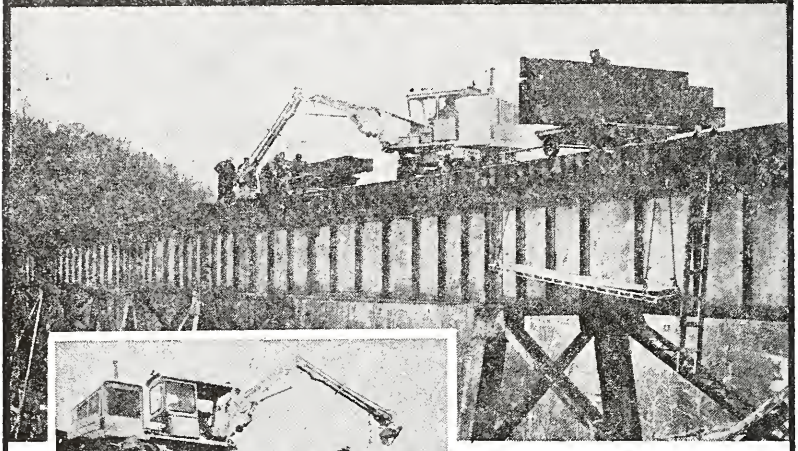
OF THE

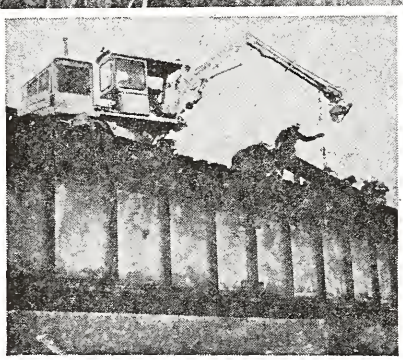
American Railway

Bridge & Building Association

1975

the NEW KERSHAW BRIDGE CRANE





Pictured above — New ties are on the push car behind the crane. Old ties are placed on the push car in front. The Bridge Crane removes old ties and installs new ones by clamping the ends of the ties.

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Proceedings of the

Eightieth Annual Convention

of the

American Railway
Bridge & Building
Association

Held at

CHICAGO, ILLINOIS

September 15-17, 1975

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R. E. Dove, Editor

TABLE OF CONTENTS

	Page
List of Officers for the Fiscal Year Sept. 1974—Sept. 1975	6
List of Officers for the Fiscal Year Sept. 1975—Sept. 1976	7
Memoir for Lee Mayfield	8
Opening Session	9
Business Session	104
Secretary's Report	104
Treasurer's Report	105
Report of Necrology Committee	107
Historical	125
Constitution	127
Honcrary Members and Life Members	132
Active Members	134

ADDRESSES AND COMMITTEE REPORTS

What M/W Men Can Do—Address by W. Thomas Rice	15
Every Living Man—Address by C. G. Massoth	22
Role of the M/W Supervisor in These Changing Times—Address by James W. Brent	29
President's Address—By John J. Ridgeway	36
Trends Toward Bridges Built with Combinations of Timber, Concrete and Steel Components—Committee Report	39
Renewal of Timber Decks on Steel Bridges with Epoxy-Bonded, Prestressed-Concrete Slabs—Address by W. R. Hyma	43
Fire Protection Systems for Bridges and Buildings—Committee Report	48
Winds of Change—Address by M. Spalding Toon	59
Railroad Needs and Federal Responsibility—Address by Asaph H. Hall	65
Terminal Facility for Rail to Water Transportation of Bulk Materials—Address by M. L. Mannion	78
Controlling Water Pollution at Mechanical Facilities—Committee Report	85
Selection and Maintenance Mechanical Facilities for Buildings—Panel Discussion	91
B&B Foreman's Training Manual by E. E. Runde	100
Current Practices in Pile Foundation Design and Construction—Address by H. W. Hunt, P.E.	108
Rapid Reconstruction of SP's Burned-Out Timber Trestle Approach—Address by T. L. Fuller	115

INDEX TO ADVERTISERS

	Page
Alert Manufacturing and Supply Co.	133 and 135
American Hoist & Derrick Company	137
Associated Pile & Fitting Corp.	131
BASF Wyandotte Corporation	139
Bella Vista Development Corp.	140
Berkel & Company Contractors, Inc.	141
Bogle Company, The R. H.	142
Chemetron Corporation, Railway Products Div.	143
Ciba-Geigy Corporation, Industrial Herbicide Sales Dept.	144-145
Conley Frog and Switch Co.	147
Conomos, John B., Inc.	146
Dapco Industries, Inc.	149
Daval Steel Products	150
duPont de Nemours & Co., Inc., E. I.	151
Elanco Products Company, Div. of Eli Lilly & Co.	153
Enerpac	155
FMC Corp., Crane & Excavator Div.	157
Fairbanks Weighing Division, Colt Industries	159
Fairmont Railway Motors, Inc.	160
Foster, L. B. Company	161
Fulton Supply Co.	163
Grosshans-Petersen, Inc.	164
Huck Manufacturing Company	165
Jackson Railroad Equipment Co., Jordan Company	166
Kershaw Manufacturing Co., Inc.	Inside Front Cover
Koehring Company, Bantam Division	167
Koppers Company, Inc.	169
Lewis Bolt and Nut Company	170
Loram Maintenance of Way, Inc.	171
MKT Corporation	172
Morrison Railway Supply Corp.	174
NL Industries, Inc., Industrial Chemicals Division	175
Ocean Coatings Ltd.	176
Osmose Railroad Division	177
Penetryn System, Inc., Restoration Division	178
Pettibone Corporation, Railroad Machinery Division	Back Cover
Plasser American Corp., Plasser Canada Ltd.	179
Racine Railroad Products, Inc.	181
Rails Co., The	183
Railway Products Division/Marmon Transmotive	173
Root, B. M. Co.	184
Russell, Burdsall & Ward, Inc.	185
Smith, Wm. A. Contracting Co., Inc.	186
Snyder Company	187
Southern Wood Piedmont Co.	188
Spectrum Infrared, Inc.	189
Speno Railroad Ballast Cleaning Company, Inc., Frank	191
Spider Staging Sales Co.	193

Teleweld, Inc. 194
Templeton, Kenly & Company 195
Texaco, Inc. 196
Torrington Company, The ..... Inside Back Cover
Turzillo Corporation 197
Vapor Corporation, Transportation Systems Division 199

PROFESSIONAL SERVICES DIRECTORY

Acres American Incorporated 201
Baker, Jr., Inc., Michael 201
Benesch & Company, Alfred, Consulting Engineers 201
Booker & Associates, Inc., R. W. 201
Boynton Engineers, Div. of Lester B. Knight & Associates, Inc. 201
Bucher & Willis, Consulting Engineers 202
Cayuga Construction Corporation 202
Clark, Dietz & Associates—Engineers, Inc. 202
Cowin & Company, Inc. 202
De Leuw, Cather Organization, The 202
Earle Gear and Machine Company, The 203
Ellington Miller Company, The 203
Gannett Fleming Corddry and Carpenter, Inc. 203
Green International 203
Greiner Engineering Sciences, Inc. 203
Hardesty & Hanover 204
Harris, Frederic R., Inc. 204
Hazelet & Erdal 204
Henningson Durham & Richardson 204
Hydro Conduit Corporation 205
Ketler Co., F. K. 205
M. Lummus, Incorporated 205
McFarland-Johnson Engineers, Inc. 205
Mike Mack Railroad Builders Corp. 206
Modjeski and Masters 206
Moon & Sons, John H. 206
Osborn Engineering Company, The 206
Pacific Architects and Engineers, Inc. 207
Railway Techniques, Inc. 207
Riley, Park, Hayden & Associates, Inc. 207
Steinman, Boynton, Gronquist & London 207
Sverdrup & Parcel and Associates, Inc. 207
Turner Engineering Company, Inc. 208
Urban Engineers, Inc. 208
URS Corporation 208
Vierling Steel Works 208
Westenhoff and Novick 208

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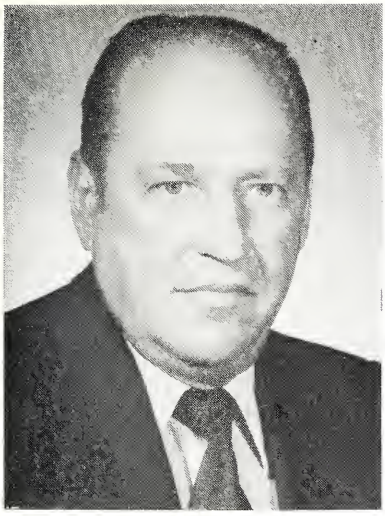
American Railway Bridge & Building Association

Sept. 1975 - Sept. 1976



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Memoir

Lee Mayfield

1897-1974

Lee Mayfield, retired principal assistant engineer for the Missouri Pacific Railroad, died December 28, 1974, at Shreveport, La. He is survived by his widow, Doris Tinsley Mayfield, a daughter Katherine M. Marshall of Palos Verdes, Calif., two granddaughters and three great grandchildren.

Mr. Mayfield was born December 20, 1897 at Winchester, Texas, and he is a graduate civil engineer from Texas A.&M. He began work for the Missouri Pacific as an assistant engineer-structures at Houston, Texas. In 1947, he was made resident engineer there, where he remained until 1955 when he was transferred to the road's general office at St. Louis, Mo. In 1957, he was appointed principal assistant engineer there, which was the position he held at the time of his retirement in July 1962.

Mr. Mayfield became a member of the ARB&BA in December 1944, and a director of the Association in 1947. In 1949, he was elected Fourth Vice President and advanced each year to become President in 1953. He was made a Life Member in 1962. His knowledge of the structures field and his winning personality will be greatly missed by members of the Association.

REMSA's table was a beehive of activity as registered railroad members picked up their tickets for the annual banquet and floor show.

PROCEEDINGS

September 15-17, 1975

The 1975 Annual Convention of the Roadmasters and Maintenance of Way Association was called to order at the Hyatt Regency Hotel, Chicago, Illinois, Monday, September 15, 1975, at 9:30 A.M., Mr. W. H. Johnson, General Roadmaster, SCL, Waycross, Georgia, President, presiding.

President Johnson: Gentlemen, you are all asked to come in from the outside and let's be seated and get started, please.

As President of the Roadmasters and Maintenance of Way Association, and on behalf of John Ridgeway, President of the American Railway Bridge & Building Association, I declare this 87th Annual Convention of the Roadmasters and Maintenance of Way Association of America, and the 80th Annual Convention of the American Railway Bridge & Building Association, to be open in Joint Session.

Before these proceedings continue, it is fitting and proper that we pause and ask divine guidance on our deliberations, and to lead us in these prayful petitions, we'll call on the Rev. Dr. Kenneth Hildebrand, retired Pastor of the Central Church of Chicago. Will

you please rise and remain standing during this invocation. Dr. Hildebrand.

(Dr. Hildebrand gave the invocation)

President Johnson: Thank you, Dr. Hildebrand. We do appreciate your coming. It is always nice to have you. We invite you to be with us as long as you wish, but feel free, if necessary, at any time to leave. Thank you, sir.

Fellow members of both Associations, visitors and guests, ladies and gentlemen:

We should have some ladies here in a few minutes, I hope.

We welcome each of you to the 30th consecutive annual meeting. We hope and trust that what has been prepared will prove profitable to you and to your Company.

This program is the result of considerable effort on the part of your fellow members of both associations. We really urge you to attend all the sessions.

Our friends from the supply industry are an important part of our convention. You will find them very knowledgeable in their field and well prepared to help you with your problems.

The visitors are cordially welcome and any of those who would meet the requirements for membership are encouraged and invited to join one or both of the Associations. Application blanks may be obtained in our registration room.

If you have not yet registered, please do so at your first opportunity. Also, our Secretary will be glad to receive any dues and get you up to date.

Our ladies have a very interesting program scheduled. We urge each lady attending to register and participate. I am sure they will enjoy the activities.

I will now turn the podium over to my fellow cohort, Mr. Ridgeway. John.

President Ridgeway: Thank you, President Johnson.

May I as President of the American Railway Bridge & Building Association, also offer to you and extend a very heart-warm welcome to this the 80th Annual Convention of the B & B Association, and the 87th Annual Meeting of the Roadmasters Association.

It's good to see you all here. I hope that you will participate in the programs this afternoon, tomorrow, and Wednesday. I'm sure President Johnson has a most interesting set of programs for the Roadmasters, and I know the B & B has a set of outstanding programs to present to the B & B members.

As always, our guests, the ladies, are welcome to attend any of our sessions.

Officers are introduced

At this time I would like to introduce to you those Executive Committee members whom we have at the head table this morning. We do not have a full compliment because some of the men have other duties in connection with the convention. I hope I have the right order.

Starting at my extreme right:

Will the gentlemen stand as their names are called and will they please remain standing until all have been introduced and no applause until all have been introduced. At the end of the introduction, those men who have other duties may be excused from the podium.

R. C. McMaster, who is a Director, is engineer of facilities and structure, Bessemer & Lake Erie Railroad.

Mr. Denz, I do not believe made it in to the meeting.

Mr. W. E. Brakensiek, bridge engineer, Mo-Pac, St. Louis.

Mr. Walt Hyma, bridge engineer systems, Santa Fe, Chicago.

Mr. J. W. Davidson, assistant director, bridge engineering, Burlington Northern, St. Paul.

Mr. Heine Huffman, vice president,

chief engineer retired, Chicago and North Western.

Our Immediate Past President, E. E. Runde, manager of construction, I. C. Gulf, Chicago.

Mr. W. H. Rankin, senior structural engineer, Frisco, Springfield, Missouri.

Our First President, J. R. (Jack) Williams, engineer of bridges, Rock Island, Chicago.

The other gentlemen at the head table, you will meet later. (Applause)

Thank you. I will return the rostrum to President Johnson.

President Johnson: Thank you, John.

At this time I would like to introduce the officers of the Roadmasters Association who are seated at the head table. We have several who are not up here at this time. They are busy with registration and other duties. They will be introduced later at other sessions.

Starting at my extreme left, and, as John, said, each one will stand and remain standing until all have been introduced. Hold your applause, please.

I will start with the Directors:

D. J. Gale, general roadmaster, Union Pacific R. R., Salt Lake City, Utah.

Mr. M. S. McClendon, general roadmaster, Frisco, Tulsa, Oklahoma.

Mr. R. K. Pullem, division engineer, Chessie System, Saginaw, Michigan. Mr. Pullem, I believe your title has been changed recently but we will call you division engineer today.

Mr. T. M. Freeman, track supervisor, Southern Railroad, Chocowinity, North Carolina.

Dr. W. W. Hay, professor, railway and civil engineering, University of Illinois, Urbana, Illinois.

Mr. R. E. Frame, district engineer, Southern Pacific, San Francisco, California.

Mr. A. C. Parker, chief engineer maintenance, L & N Railroad, Louisville, Kentucky.

That's our Board. Next is the officers, and the next will be our Treasurer.

Mr. H. D. Hahn, director of public works, Engineering, Chicago & North Western, Chicago, Illinois.

Next is our 2nd Vice President, W. J. Cruse, assistant chief engineer of staff, Rock Island, Chicago, Illinois.

Our 1st Vice President, R. E. Dennis, regional supervisor of maintenance, Canadian National, Winnipeg, Canada.

Thank you, gentlemen. (Applause)

I will now turn the podium back to Mr. Ridgeway.

President Ridgeway: Thank you, President Johnson.

We are indeed fortunate this morning to have with us the Chief Executive representative of a sister railway engineering group. Looking around, I am sure many of you also belong to this organization. I refer to the American Railway Engineering Association. It is my extreme pleasure to introduce John T. Ward, Senior Assistant Chief Engineer of the Seaboard Coast Line. Mr. Ward would like to have a few words.

Greetings from A.R.E.A.

Mr. Ward: Mr. Johnson, Mr. Ridgeway, others at the speaker's table, ladies, members, and guests:

Standing before you today, representing the American Railway Engineering Association, certainly gives me a great deal of pleasure. I say this for many reasons, none the least of which is to be sitting up here at the speaker's table among so many distinguished people and also among friends of the company that I am associated with, Seaboard Coast Line Railroad.

Our keynote speaker this morning will bring us a message in a few minutes and he will be introduced at a later time and I am sure we will all have an interest in what he has to say.

Mr. W. H. Johnson here is President,

of course, of the Roadmasters' Association. He and I have been associated together on the Seaboard for many years. When I first came with the Seaboard, back in early 1943, Bill was then serving under the same division engineer I reported to in Raleigh, North Carolina. It has been a pleasure to see Bill's progress on in the railroad industry through the years on up to general roadmaster, his present position.

Incidentally, there haven't been very many occasions where representatives of the same carrier serve sister organizations such as the Roadmasters and AREA at the same time. Bill and I feel it quite an honor to so serve.

Many of you present today, as John just said, are members of AREA. I would like to remind you of two upcoming meetings and ask that you mark these important dates on your calendar.

The first is the Annual Regional Meeting, which this year has been scheduled in the Hotel Vancouver, Vancouver, British Columbia, Canada. This meeting is scheduled for just a month from now, on October 30.

The second that I would like to call to your attention is the Annual Technical Conference, which is scheduled here in the Palmer House, Chicago, next March 22 through 24. Excellent programs are in the making for each of these meetings you will benefit with your presence there.

Speaking of the AREA, most of you know its executive director, Mr. E. W. Hodgkins. Earl is not here today. He is in the Presbyterian St. Luke's Hospital, just south of the Loop, faced with open heart surgery tomorrow. I trust that your thoughts and prayers will be with Earl on to a speedy recovery.

Thank you, Bill, for giving me these few minutes to bring you greetings from AREA this morning. I trust that both Associations will have successful meetings, and with this program I have in my hand, I don't see how you can fail. Thank you. (Applause)

President Ridgeway: Thank you very much, John, for those words. It is indeed a pleasure to have you with us this morning. We hope your busy schedule will permit you to take in some of our sessions of some of these meetings. Bill.

President Johnson: Thank you, John.

As we stated earlier, our supply friends are a very important part of this Convention. We who have worked in the preparation of this program, not only this year, but in the past years, know this more than most of you realize. They do a good job and it is appreciated.

I would like at this time to call on Mr. Harry Campbell, President of the Railway Engineering Maintenance Suppliers Association, REMSA, as we know it, to say a few words. Mr. Campbell.

Greetings from REMSA

Mr. Campbell: President Johnson, President Ridgeway, special guests, ladies and gentlemen:

It is indeed an honor for me as President of REMSA to take part in welcoming you to your Annual Convention. All members of REMSA join me in wishing you a very successful and productive 1975 meeting.

I want to remind y'all that I have been telling you for years to save your Confederate money because the south was going to rise again. Well, we have taken over. Here's Bill Johnson, President of the Roadmasters, Johnny Ward, President of AREA, and here I am, President of REMSA.

Now we did lose out a little bit, slipped up and John Ridgeway did slip in as President of the B & B.

At this time I would like to present to Bill Johnson—Bill, if you will, please —REMSA's gold pin, which reads:

"President—Roadmasters And Maintenance of Way Association of America —1974-75." Bill. (Applause)

President Johnson: Thank you, Harry. I have admired these pins for a number of years, seeing them worn around. I do appreciate this. I certainly thank REMSA and their Board. Thank you.

Mr. Campbell: Also, to John Ridgeway. John, if you will, please. I would like to present on behalf of REMSA a matching pin, which reads: "President —American Railway Bridge & Building Association—1974-75." John. (Applause)

President Ridgeway: Thank you very much, Harry. I, like Bill, have always admired the gold pin, and never quite aspired that I would attain one, but now that I have, I certainly will wear it very proudly. Harry, I wish to thank you and your fine organization. (Applause)

Mr. Campbell: The Convention this year is in a new hotel. We hope that your stay in the Hyatt Regency, as well as in Chicago, will be pleasant. All the officers and directors of REMSA are at your call. If there is anything we can do to make your stay more enjoyable, more trouble-free, please call on us.

We know that many of you are looking forward to the Banquet Tuesday night in the Regency Ballroom. Complimentary tickets are available for all registered railroad personnel and their wives. You will hear more about the entertainment at the Banquet shortly. Thank you very much. Bill, thank you. (Applause)

President Johnson: Thanks again, Harry.

The 1st Vice President of REMSA, Mr. L. E. Martin, has a few words to say, which I'm sure you will find worthy of your close attention. Mr. Martin.

Mr. Martin: Thank you, Bill. It's my privilege to speak to you this morning in behalf of REMSA about the fun part of the Convention. We've put together some entertainment, which will follow the Banquet Tuesday evening and which we hope will be pleasant and relaxing for you. It's a little different type of entertainment than the entertainment profession seems to be coming out with these days. Their thoughts seem to be that we all want to be scared to death, with movie presentations like "The Earth Quake," which was designed to shake you out of your seats. And you may have noticed they put you in a hotel like this, they put you on the 35th floor, take a look at the TV and they are featuring "The Towering Inferno" as the featured movie. I understand the Chicago Theatre is going to run "Earthquake" and "The Towering Inferno" as a double feature, and they're going to headline it "Shake And Bake."

Our program is going to be a little bit different. It's going to be in the Old Chicago setting here in the hotel. The doors will open at 6:30, and Bill Bailey's Banjo Band, a number of you have heard him, will greet us at the door.

Wayne Rowland, a nationally famous comedian, who has been performing at the MGM Hotel in Las Vegas, is coming in here to entertain us.

The Palloways, song stylists and recording stars.

The Crowl Sisters, three very attractive and talented gals.

And, of course, our old friend Benny Sharp and his Orchestra will be there to play for us during the dinner. I think it will be a very entertaining affair. It's not going to be too long so you will have plenty of time to visit with your friends and suppliers after the show.

The same ticket arrangement that we've had in previous years will be followed. That is, all the railroad employees and their wives, or a com-

panion of their choice, will be the guests of REMSA. The suppliers and other people attending the convention may purchase tickets from the REMSA booth, out here in the registration area.

We look forward to seeing you at our Banquet. Hope you enjoy it. Hope you have a very pleasant and successful convention. (Applause)

Introduction of W. Thomas Rice

President Johnson: Thank you, Lou.

It is indeed an honor to me that I have the privilege to introduce our next speaker, who will deliver our keynote address.

He was born at Hague, Virginia, June 13, 1912. He was graduated from Virginia Poly-Technic Institute in June, 1934, with a B.S. degree in Civil Engineering. Also, received an honorary LL.D. degree from Stetson University in May, 1959.

Employed by the Pennsylvania Railroad, in the Operating Department, in 1934, until called to active duty in the United States Army in 1942 with the rank of 1st Lieutenant.

One of his positions with the Pennsylvania was Track Supervisor. He served three years in the European and Asiatic theatres. He served in the active United States Army Reserve, attaining the rank of Major General.

His decorations include the Legion of Merit, with two Oak Leaf Clusters.

He entered service with the R. F. & P. Railroad in February, 1946, holding several managerial positions. He was elected President of the R. F. & P. Railroad on January 1, 1955.

He became president of the Atlantic Coastline Railroad August 1, 1957. And upon the merger of the former ACL and SAL Railroads, July 1, 1967, he was elected president and director of the merged companies into the Seaboard Coast Line Railroad Company.

At present, he is chairman and chief executive Officer of the Seaboard Coast Line Industries, Inc., the parent Company of the SCL and L & N Railroads.

He is a director of the R. F. & P., Association of American Railroads, and a number of other companies in the banking, insurance, and manufacturing fields. He serves in directoral and advisory capacities to several institutions of higher learning.

My top boss—Mr. W. Thomas Rice. Mr. Rice. (Applause)

What M/W Men Can Do

By W. THOMAS RICE

Chairman and Chief Executive Officer, S.C.L. Industries

Thank you, gentlemen.

President Bill, President Ridgeway, members of the Governing Boards, honored guests, ladies and gentlemen:

I'm delighted to be here with y'all this morning. Bill told you I have been a track supervisor. I was a track supervisor for three different locations on the Pennsylvania and then the R.F.&P. So, being with you folks is like putting that rabbit in the briar patch. I'm right where I belong, and I'm delighted to have the opportunity to be here with you.

I hope y'all had a successful Saturday and your favorite team won. Some of us didn't have that experience. I heard a little story the other day. You may or may not have heard it.

There was this football player, apparently with a university in the south, playing his arch rival. It was a bruising defensive game and nobody had scored. It was getting along in the latter seconds of the fourth quarter. Finally, on this one team all the quarterbacks had been hurt but old Bill Ford. He wasn't very smart on the football field but he tried to do what the coach told him to do when he could remember it. And the coach had to finally put him in. And he called the play and it was a broken play and he carried the ball himself through the middle of the line and scored a touchdown, they kicked the extra point and won the game.

When he came off the field, the coach said, "Bill, what was that play you ran?"

"Why," he said, "No. 13."

W. Thomas Rice

The Coach said, "We don't have any play No. 13."

Well, Bill said, "I know we don't, coach, but I looked on the back of Joe's shirt and it had an 8 on it and I looked at the back of Bill's shirt and it had a 6 on it and I added the two together and got 13."

He said, "Well, 8 and 6 don't make 13—it makes 14."

He said, "Coach, if I was as smart as you is, we'd have lost that game."

With due apologies to the Doctor here who gave us such an inspirational invocation, I want to tell you a true story about a roadmaster. This happened years ago, probably about the time this organization was being formed. (Deleted)

I want to congratulate you, Bill—you're running this thing right on time

and I don't want to mess it up. As old Irving S. Cobb said, "No speech is bad if it's short enough." And I believe that is a pretty good criterion on which to base your remarks.

I do have another story that I have told so many times to our people, because it's true and I think it's quite interesting. It indicates a lot that goes on with the younger folk and perhaps what I have to say this morning is applicable to it.

It seems when Gen. Omar Bradley was Chairman of the Joint Chiefs of Staff, and, of course, he was located in the Pentagon, he boarded a plane at National Airport dressed in civilian clothing. By the way, this is a true story. The General confirmed it. And he happened to be seated next to this enterprising young man dressed in the uniform of a private in the Army of the United States. And this lad was one of these kind you probably have known—he just wanted to know everything about everybody. He looked the old General over for a while and finally he said, "Hey, buddy—what's your racket?"

The General looked at him and in his kindly way, and he was a wonderful gentleman, said, "I'm in the same great organization you're in—the Army of the United States."

The boy looked at him and said, "What are you, about a Master Sergeant?"

And the General said, "No, no—I'm a Commissioned Officer."

The kid came right back and said, "What are you, bud—a Major?"

The General, later telling it, said he knew it had to come out, he couldn't shut that kid up, so he looked at him, and he said, "Son, I am General of the Army—Omar N. Bradley, a Five Star General, Chairman of the Joint Chiefs of Staff."

He said the boy looked him right straight in the eye and didn't even blink. He said, "General—you've got a big job. Don't louse it up!"

So, that's my job this morning.

I've always thought in reality that people involved in the maintenance of way, roadmasters, B and B, they are the basic people of our railroad. Certainly they built it and maintained it. There is something about it I reckon we all who have had the good fortune to work in that line of it look back upon it as the greatest period of our work in life of learning something about what makes a railroad click.

If you haven't seen a gang of men lining track and singing and learning the words of that song they sing when they rap that lining bar against the base of the rail, you've missed something. To me, that has the same appeal that a steam engine has with a whistle when it would blow it in the middle of the night. There is so much about the basic qualities of maintenance people.

I reckon I'm a little prejudiced because I always thought I was one. At least, I aspired to be. And it's great to see so many of you here and to know that you represent that group of which I speak. I have always thought they were the basic people. Certainly they built the track and goodness knows when there is trouble they are the first people there, whether it's a storm that washed out a bridge or whether it's a wreck. And pitifully, when we have conditions like we have had this past year in traffic, they are the first to feel the axe of the budget cutting, as all of you well know, and I am sure many of you have had that experience this current year.

Railroads are still private enterprise

But as we think, here we stand in the year of our Lord, 1975, and we are just on the threshold of our 200th Anniversary of this country, and our railroad business has been going on under

the private system since back somewhere around the early 1830's. I suppose today we have the greatest challenge we have ever experienced in all these many years of keeping our railroads operating under the private enterprise system. And it is a tremendous challenge, gentlemen, and one that you, and I, and every other railroad employee must accept and do our best to win.

We have in the industry today several of our major companies that are in bankruptcy. We had bankruptcy back during the depression years of the '30's, but never one like this, when you have had the greatest prosperity this country has ever known in the latter part of the '60's and early '70's and still with other companies going forward at an unbelievable pace and the gross national product going up, and here we are with some of our major railroads in bankruptcy and others awfully close.

You go into the money lender's office, you go to Wall Street, you talk to the security analysts, you talk to your bankers, and if you are representing railroad paper they get that cold gleam that you heard about back in the '30's, that people used to get when they talked to bankers, where you couldn't tell which eye was a glass eye, you recall.

It's just simply the old expression of a hunter—you give a dog a bad name and you might as well shoot him. And we have a bad name, there is no question about it, in the financial world.

The collapse of our major railroads in the northeast has caused great concern as to the stability of the American Railroad System.

Truckers win advantages

The competitive advantages, and I say this with deep sincerity, because I am terribly fond of many people who are involved in other forms of transportation, but the competitive advantages of our competitors is just unbelievable. They use everything that happens, and rightly so, to them. This thing about the energy crisis and the shortage of gasoline and speed limits of 55 miles an hour caused the truckers to go into Washington right quick and get a bill in the Congress increasing their load limit to make up for the slow movement of the truck on interstate highways that was causing them to spend more money for labor and delaying the movement of the traffic—and they had a great story to tell and they were successful.

Yesterday afternoon I drove from Richmond to Washington to get a plane to come out here and I was going 58 miles an hour by one of these speed control things on the automobile and these trucks were going by me like I wasn't even there. They won the battle so now they are right back at the same old stand.

Our water competitors are doing a great job with the Corps of Engineers and they are threatening to do things that many of you are involved in. Certainly this Lock and Dam 26 on the Mississippi is just a forerunner to something that would take a great amount of traffic from the railroads. And just recently, and I don't mind telling you, and many of you know it, one of the main waterways between the Gulf Coast and Birmingham was damaged as a result of one of the locks going out and, believe it or not, our railroad got 1,000 cars of traffic the first week the thing was out that we wouldn't have handled if it hadn't been. Just thing of the traffic that is now moving up and down the waterways—maintained by your dollars and mine and the rest of America, for our competitors. So, you see, that's a real serious thing.

The gentleman over here whom I heard introduced just now from the

Burlington Northern, and it affects every coal-hauling railroad, this proposal in the Congress of the United States to establish these coal slurry pipelines by which we'll move coal by pipe and water, particularly applicable in our sand to the west, but it could come on to the east and get into our Appalachian area and get into the coal mines served by every railroad in this country.

There are those who are advocating it strongly to give them power of eminent domain to make a profit, if they move coal that way. And, of course, they will get the cream, gentlemen, as you know. They'll serve the big mines to the big consumer, if that is ever built. And it will be built and there again the railroads are buying cars, buying them on a 15-year basis, to haul coal during the energy crisis, and how many do we buy if they are going to build these slurry pipelines? Where will these cars be 15 years from now when we are still trying to meet the payments on them?

Regulatory agencies give problems

These are the things we are all faced with and certainly the regulatory agencies do give us a problem in many areas. I'm speaking of this because you have it as well as we. You probably don't run into it on a day-to-day basis, but your management does.

Just recently we received authority to put in some intra-freight rates in one of our states that had been in effect on an interstate basis for eleven months. In other words, simply because the car didn't cross the state line we were held down for eleven months while these gentlemen who were elected at the ballot box procrastinated as to whether or not we should get that rate increase.

These are things that, I don't know how often you hear of them or often you know them, but as railroad men involved in this industry, you definitely have an interest in it and should know it, and I'll tell you later something you should do about it. And certainly every city and town that your track runs through, I am sure you have real dealings there. Everything from weeds in the ditch to repairing crossings, and I vonder how many of the "city fathers" know who pays the bill or cares. If a truck tears up a crossing, what happens? If a crossing is torn up, they look to the railroad and they look to you to do something about it.

I hope every time you do it and every time you are called on the carpet by some local "city father" about the condition of the track or the weeds or the ditch through their community, or the grade crossings where a horrible accident happened, let him know that private enterpirse is at stake here, as the railroads are hard-pressed for the cash flow and they need a sympathetic understanding on the part of these "city fathers" and state governors and everybody in the legislative halls of our nation.

Questions advisability of new agency

I understand you have Asaph Hall coming out here to address you. We have the Department of Transportation, and I don't mind telling you that back in 1958, when the AAR Board was first confronted with whether or not we would support a Department of Transportation in the federal government, there were then some of those old gentlemen, who have now gone to their final reward, sitting around a table who were very dubious about setting up a cabinet office. Remember the Cabinet who would be involved in transportation? They had great concern as to what inroads they would make as to controlling this industry and whether it would just be a further reg-

ulatory agency that would control us, in addition to the state and federal regulatory bodies. And I ask you, how right they were.

So I say all these things because basically these are challenges. And they are opportunities, too, because whenever you get into that you get into the stability of our free enterprise system. And free enterprise, once you lose it, you've lost it all. Those of you who have seen the railroads in the foreign lands and the United Kingdom, you know exactly what I'm talking about.

Certainly there are people in Washington today who are looking and who advocate the nationalization of the American railroad industry. They have not thought it through and they are not interested in thinking it through. They are only thinking of the control, bringing everything into Washington. And I live close enough to it that I don't recommend it.

Getting back to this group, this wonderful group here today, who try to analyze the cost of the maintenance of the railroad and how to do a better job, certainly when you look at a cross tie today, they cost over $10 and you and I remember when you could buy all you could "tote," as the old expression goes, at a dollar apiece or less. The millions of dollars it takes today to just tie a piece of railroad is absolutely fantastic.

It's like that little boy who came home from school one day. He had tear stains on his cheeks. His daddy was out in the yard and he knew his boy had been crying and he said, "Son, what's wrong?"

He said, "Daddy, you remember last night I asked you how much money was a million dollars?"

And the father said, "Yes, I recall."

The little boy said, "Well, daddy—a hell of a lot of money is the wrong answer."

You fellows, and with all due respect to our suppliers, and they are great, they are out there and they have done a great job for this industry with the things they have designed and the machines they have come up with and the things they have done to help us in our maintenance work. But we have to find ways and means of doing it cheaper. The cash flow just does not allow anything but the tightest type of scrutiny, if we are to survive. And with ties costing what they do and rail costing what it is, and bridge timber costing what it is, you and I both know every time you put a gang out there you are spending big money and you are the gentlemen who control it. I challenge you to use the utmost capabilities you have in keeping your cost at its lowest possible level consistent with the safety of your properties.

We need department cooperation

And certainly frequent inspection is so necessary. And the coordination with the Operating Department. I know and you know there were times when all of us went to a derailment and they were trying to put the blame on the other guy. There wasn't any desire to tell the truth. You did everything you could to prove somebody else was guilty and not your department. Well, that day I hope is gone. It was so stupid. The thing is, to find the answer and to correct it. That's what we need to do if we are to survive and working with the operating department to get the maximum use of the tracks. When you are spending so much money and when that gang is idle and those machines are idle, it's money going down the drain.

You'll find a real bright-eyed, bushy-tailed superintendent who is only thinking about moving his trains and probably never has worked on the track and has no idea of what track

maintenance is. Educate him. He needs to be and he's willing to be, so that you can get the maximum time. But, above all, give it back to him when you would, because he's got a lot at stake, too. It's a team job. It's like a football team, you need all eleven men doing the same thing and working towards the same end.

Machines accomplish so much

These wonderful machines, I don't even understand them any more. In my days of track maintenance we didn't have anything like that, and I look at them now in amazement. I see old Bill Blix sitting back there. He and I used to go to the string line curves and put that 6-foot rule on them and then sit up all night trying to figure out the throws to make them ride well. Now you have a machine that does it all and I think about the sleep we lost for nothing. Now all you do is put a machine out there and it does the whole job.

But those machines must be used, and used effectively, and they must be maintained. When you have them sitting still, just think of the money that is tied up. And there are so many things, and I know you gentlemen are just exactly like all good maintenance people, you are involved in keeping your track in the best possible shape within the budget you are allowed. There is a lot you can do to help your railroad.

When you see an empty car sitting around in the bullrushes somewhere back of the station and you realize it has been there for a couple of days, call up your car distributor and tell him about it. That thing is just bleeding money away for nothing. Perhaps some local freight jock forgot it was there.

There are so many things you can do that don't necessarily relate to your department but relate to your Company. Again, it's a team job.

Strive for maximum production

And certainly the programming of our work, so that you get the maximum production out of your people and and not move them all around. With what we pay people now, to move them all around and the travel time, and meals away from home, it's chaotic compared with what I once knew, and what some of you older gentlemen once knew. Your program to get the maximum time and productive effort out of every day. And all of these things you know, but they are so vital today if we are to keep these companies sound financially.

Have story to tell

I bring all this up because we have such a great opportunity. We have an energy crisis the like of which we have never known. We have an opportunity because our railroads can move a ton with less energy than any other forms of transportation on land. We haven't been able to get that over yet. We haven't been able to sell it. We haven't been able to get the Congress to recognize that the railroads of America are their only salvation with coal, our own natural source of energy. We need a strong rail system to move this coal to the point of consumption, and for some unknown reason there is an inability to sell this thing. Maybe we aren't working hard enough to try to sell it, you and I and every other man involved in railroading.

The average man on the street thinks in terms of the last time he rode a passenger train as it relates to railroads. The analysts in New York, the newspapers, many of them, their only idea of railroading is what AMTRAK is doing today. They have no conception of what we are really doing. And

it seems to me that somewhere along the line this energy crisis must result in a tremendous increase in our traffic volume, because we can give mass transportation cheaper from the standpoint of energy consumed than any of our competitors on a real dollar basis.

And that gives us something that all of us can work on. When you're going to these cities and these communities and you talk to these local politicians, I beg of you to talk to them along these lines, that if the railroads didn't pay their taxes and were nationalized, what it would mean to them, and suggest they carry that message to their people in the Congress.

Need all the help we can get

You see, these people in Washington react to grass roots. We can have all the lobbyists in the world up there, but if Old Joe back home who voted for him writes him a letter and he knows that Joe Blow has a big family and a lot of people who vote in that family and a lot of friends in little towns, that's very meaningful. You gentlemen have contacts in these little towns that nobody else has, because I know you are over your railroad and you are in these areas. You know these folk, and they are the ones who can help us in this fight to survive. And I say this in all sincerity, that with the attitude we have today, it is truly a survival of the railroad industry and the private enterprise system that we are faced with.

I'm looking at my watch because whenever I meet with a group like this there are so many things I want to say to you because you can be and are such a vital part of our industry.

I want to assure you that your management, when your budgets are cut, does it with a great deal of concern and distress. It's just a case of trying to make the dollars reach. And with the past twelve months, with the decline in traffic we have seen on many railroads, it has resulted in a tremendous decrease in M-W budgets. But I can assure you that I know enough of your managements to know it concerns them just as deeply as it can. And I appeal to you, and challenge you, to do your utmost to build a climate in the areas in which you work, where the people of America understand the importance of the American railroads and the free enterprise system. We haven't done the job of educating them as we should.

I say to you, like that old couple in the mountains of Virginia, one morning they were awakened by the clock striking seventeen times, and the old gentleman asked his wife what time it was, and she said, "I don't know, but I think we'd better get up—it's later than it's ever been before."

With that message on our railroad system, and I'm not that pessimistic because I think we have something that's great and we want to keep it that way. I wish you every success in your deliberations here in Chicago. I'm sure with the type of dedication I have always known with employees who make up the maintenance-of-way forces of the American railroads, the dedication and the loyalty of those folk, we'll find a way out of our present dilemma.

Thank you very much. (Applause)

President Johnson: Thank you, Mr. Rice. It was very good; I certainly enjoyed it. I'm sure it was well taken. We'll accept that challenge that you've given us.

We value your presence, we know you have a busy schedule and many demands on your time, but we will be delighted to have you stay for as much of our program as you can and when it's necessary to leave, feel free to do so.

On behalf of the Association, and myself personally, many thanks.

Now I'll turn it over again to Mr.

Ridgeway, who will introduce our next speaker. Mr. Ridgeway.

Introduction of Clifford Massoth

President Ridgeway: Thank you, Bill. Since we are running a few minutes ahead of schedule, you may wonder what this bouncing ball bit is. I think Bill Autrey last year had the best explanation. It's to keep both Bill and I awake up here.

Our next scheduled speaker this morning has spent his entire working career with the I. C. and the I. C. G. Railroads.

He is a graduate of the University of Chicago, and served his first seven years in railroad freight sales.

He became editor of the Illinois Central Magazine and later was placed in charge of the I. C. Public Relations Department. Currently, he is director of corporate relations.

He is a Past President of the Railroad Editors' Association and recently was President of the Railroad Public Relations Association.

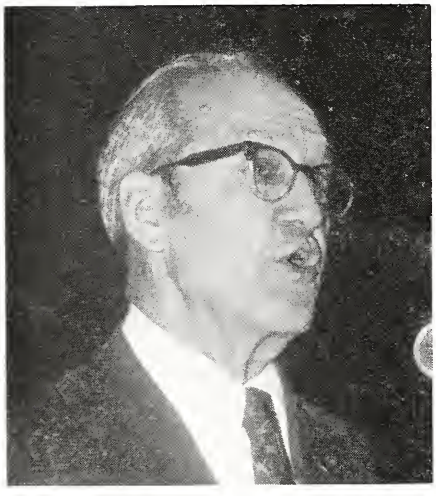
He is an active writer and speaker on railroad matters.

At this time, it is my pleasure to present to you Mr. Clifford G. Massoth, who will speak on the subject "Every Living Man." Mr. Massoth. (Applause)

Every Living Man

By C. G. MASSOTH

Director Corporate Relations, Illinois Central Gulf, Chicago



C. G. Massoth

Thank you, President Ridgeway.

I am delighted to follow on the heels of President Tom Rice's talk because many of the things he touched upon, I will expand in the remarks I have here.

I have always been given to understand that a public speaker should open his talk with a good story. Seeing this group before me reminds me of the national convention that was called by the President of a great pharmaceutical firm, and he said, "Gentlemen, we are here because we have a problem. And our problem is this.

"Our firm is doing great in every division—in every division except the laxative division. We have the best laxative that's made. We buy the best products. Our engineers and our re-

searchers are the best. Our laboratories are the finest. But there is one firm that beats us every year. They don't have as good product—but they have a wonderful name—'Serutan,' 'nature's' spelled backwards. That's what we need, is a new name, and the man who comes up with a new name at the end of this convention will be given two weeks in the Bahamas, with all expenses for his wife and his family. And we'll look with favor upon his career."

They all went to work. Three days later, the President got up, he was very excited, and he said, "Gentlemen, we have some wonderful names—but one here that puzzles us. We like it. It's short. It's interesting. But does it have hidden significance? Who sent in the name 'Oppo,' 'Oppo?'" The man way in the back of the room stood up, put up his hand, and the President said, "Sir, is there hidden significance to it?"

"Why, yes," he said. It means 'poop' spelled inside out."

Want to be optimistic

I've got you off to a good start to be optimistic, because that's what I want you to be—optimistic.

You may wonder, "Where the hell has he been all this time? There's not much to be optimistic about." I know it has been a hard year for all of us. You've had to lay off people—good people—good railroaders. I have had to lay off people on my staff. It's never easy to do.

In the meantime, though, there are important tasks that need doing. And here's where the skill of good management is called into play. Where do we spend our limited funds? Which section of the track should get the reduced number of ties and loads of ballast? Which bridge or trestle to remain under slow order while you take those beams and timbers some place where you have had a wreck?

And for our compatriots over on the mechanical and operating side, which runs do we consolidate? Which cars do we repair? Are the needs of the coal producers more important at this time with the energy needs than those, say, of the grain people, with the vast flow of grain we know is going overseas this year? It's hard to tell.

All we know is, we look into a crystal ball, and we have to look months and months ahead. I'm sure there are railroads, many railroads, where there are embarrassed marketing people who pressured management to buy covered hoppers. And those covered hoppers came just about the time that business went to hell. Or that big order of coal cars that started to arrive just about the time the big mine they were built for decided not to open because of marketing conditions.

Be of good cheer

So it's not an easy time to be cheerful, men,—do we have any ladies left? —and lady, but that's what I'm going to ask you to do—be cheerful, be of good cheer, because when you are, you help the people who work for you, and in turn you help your company and you help our railroad industry. And most of all, you help yourself.

I started to work in the middle of the depression as a young freight salesman. I want you to know, I still remember the song, "Happy Days Are Here Again." They may not be here yet—but they're coming. And they are coming for one big reason—we work in a useful industry, we do a useful job—and never forget it. It's a job no one else can do.

Tom Rice has already given you a good graphic description of the competitive advantages of our competitors. But we do a useful job. But it's not always easy to prove that point. The huge sums that you all know about,

poured by our government into the needs of our competitors hurt us very much. We have a hard time proving that we really are the low-cost industry, but we are approaching the time when the American public is going to know that better than they have ever known it before.

Favorable legislation is imminent

At the present time, 150 important transportation bills are in the Congressional hopper. Congress went back to work on September 3. Out of that welter of bills, Congress inevitably is going to come up with new laws, new transportation regulations, that will help us move towards a more balanced regulatory form. Better regulation—and that's what we've suffered from. And as Congress does that, the true cost of moving goods is going to become more and more apparent.

We have a strong Secretary of Transportation in William Coleman. He has said again and again that railroads suffer because of regulatory delays and because of national promotion of our competitors.

We have a National President who says he believes in the free enterprise system. He's against nationalization. And we have a growing number of American citizens who are beginning to understand that we are not getting a fair shake.

And we have really great advantages for our future. In a world, and Tom Rice mentioned it, in which the efficient use of energy is becoming more and more important, you know the story, we can move four times as many ton miles with the same gallon of fuel oil as the trucker on the highway.

You also know this, that when it comes to the use of space, you people know that we are efficient users of space. Our national rail system is built. We don't need any more land. Oh, we may need a little for some expanded freight yards or a new freight yard here and there. But basically the American system is built. In fact, we can very well give up some branch lines.

Interstate highway plan is cut

Meanwhile, the public is turning against unlimited highway building. Recently a segment of the planned Interstate system was stopped cold. A few years ago such a setback for the road builders was unheard of. But the 9.6-mile segment of Interstate 66 through the Virginia suburbs into Washington will not be built. Why? Because ordinary people never gave up in their fight against having a wide band of cement rammed through their back yards.

I said "ordinary people." That was wrong. They are American citizens who did something extraordinary. They put a dent into the 42,500-mile Interstate system. After reviewing all the facts, Secretary of Transportation Coleman last month said that section will not be built.

Remember this statistic and use it when you are having a neighborly beer over the back fence or are talking with a member of your civic club: Each mile of interstate gobbles up 37 acres of land. That's about seven square blocks. Much of that land is the farmland. Some of it is beautiful woodland that we ought to hold inviolate for future generations.

In my work we know we can't do much without public support. Without it, our company can't succeed, our industry can't succeed.

Bear in mind most Americans do not know a great deal about railroads. Many have never been on a train. Many adults today were youngsters who grew up in front of televisions. They wanted their own cars almost by the time they were out of grammar school. Too

often their knowledge of trains is the long freight drag lying across the highway as they wait in their car. The train stands—and stands. Finally a trainman walks up the track. The motorist brightens up and thinks, now they are going to move that damn thing. But it doesn't move. Then some of the more impatient motorists angrily whirl their cars around, cut acorss curbs and lawns and roar away, seeking a different crossing.

Discusses land grants

A great part of that public believes railroads got a big handout. You have heard innumerable times, as I have, that government gave railroads all their land for nothing. Not long ago, Alan Boyd, ICG president, with other presidents met Secretary of Transportation Coleman. Even he, brilliant lawyer, widely educated man that he is, said—"After all, gentlemen, you got your land for nothing!"

Some roads indeed did get great acreages of public land. Bear in mind, at the time that land was a vast waste, mile after mile. The only way to persuade a railroad to invest millions of dollars to lay track across that great emptiness was to give that road part of it.

My own road was a land-grant railroad—the first, in fact. Our original charter line in Illinois was 705 miles long when completed in 1856. It was the longest railroad in the world. Within a decade it transformed the state, first bringing in thousands of workmen, then many more thousands of settlers.

The land may have been free, but the gift had strings attached. From the beginning we have paid the State of Illinois a special seven per cent tax on gross revenues earned on that line. Up to April this year we have sent a total of $250 million to the state treasury for that so-called free land.

Also we, with other land-grant railroads, for many years gave the government reduced rates on their traffic. Those reduced rates finally were terminated in 1945 after World War II. In total, they gave the government transportation services worth $1¼ billion dollars, or about 10 times the original value of the land.

But the big fact to remember is that only eight per cent of the railroad land came from land grants. That's right. The 92 per cent of the more than 200,000 miles of main line is on land purchased from its owners by railroads.

That land-grant myth too often has been used as an excuse to explain away the billions of dollars of subsidy given to our highway, waterway and airway competitors. Their facilities were built out of the government treasury with taxes you and I pay, taxes, ironically, that railroads also pay.

So don't ever again let someone in your presence talk about all that free land without speaking up. "Just a moment, sir, let me tell you about that free land."

We need every living man to tell our story. In these days of EEO I should say, every man and woman. Only 20 years ago we had more than a million employees. Now we are down to half that number. There are towns along the railroads—many of them—where the train doesn't stop and where we do not have a single employee today.

Must regain the human touch

Once there were thousands of passenger trains serving almost every city and town. Everyone knew exactly when the trains arrived. The agent was a big man in town. Railroad jobs were highly sought. The high-school football or baseball hero signed on as a trainman or a fireman, hoping one day to work up to conductor or lordly engineer. The president of the high-school class

got a letter from the agent recommending him for a job at division headquarters. We have lost the human touch with those townspeople.

We need to regain that human touch. It is vital to the economic health of our companies and to our futures as employees. Railroad people need to be seen and heard.

,I remember accompanying the members of a church men's club in a visit to a freight yard. They climbed the retarder tower and watched the cars roll down the hump. They listened to the yardmaster explain the movement of cars. They watched the yard engine making up a dispatch train for New Orleans. At the end of the visit one of the men said, "That was wonderful! But why do railroads have a policy of keeping people out? Why hide like that?"

I was thunderstruck. Then I asked among the group. "Is this your first time to see a working freight yard?" And almost without exception, none had ever seen the interesting flow of events that go on day and night in a freight yard.

We are not putting our best foot forward when we fail to recognize the tremendous interest railroading has for most people.

Superintendent is asked to speak

Speaking of that visit reminds me of an experience I had with the superintendent of that same freight yard, which happens to be Markham Yard, 20 miles south of Chicago. A call came in for a speaker. We try to find speakers for any organization seeking one. As you probably know, the civic clubs —Rotary, Kiwanis, Lions, etc., meet weekly and are constantly in need of speakers.

The man who called was frantic. He was the program chairman of a club, and his speaker had been in a car accident. They needed someone for Thursday night, only two days away. It was ladies night—their big annual affair.

I was tied up that night and so was our other short-notice speaker in the office. I went back to the phone.

"How would you like to have someone talk about Markham Yard?" I asked him. "It's near your community. Very interesting."

"That would be great," he said. At that moment he would have taken a patient from the state mental hospital, with or without a straight jacket. "I'll call you back," I said.

Now, asking an officer to make a speech on short notice is like asking him to uncouple a string of ammunition cars while one is on fire. I knew I would have to use a little body English when I called the superintendent of that yard.

"Hey, Joe, you've been holding out on me."

"Waddaya mean?" he demanded.

"I didn't know you were such a good speaker. The Homewood Kiwanis Club wants you to tell them all about Markham Yard this coming Thursday night."

The sound on the other end of the line was that of a man strangling. Then there were some words that the sports writers today often spell out as "bleep." The overall effect of his answer was that he had never made a speech in his life and he was "bleep, bleep" if he was ever going to make one.

The situation called for guile.

"Joe," I said, "I'm trying to remember. Markham Yard is a hump yard, isn't it?" The answer had the tone of, you dummy. "Of course it's a hump yard. It has two, a north and a south."

"It's about two miles long?" I asked innocently.

"Hell, it's nearly 4 miles long," he answered, and he went on to give a beautiful capsule description of Markham.

When the rope was good and tight, I said, "Say, Joe, that's what they want to hear—all about Markham and what goes on there. And they want you to bring your wife because it's ladies night. And Joe, I wouldn't take more than 20-25 minutes. Then let them ask questions.

And with that I immediately left the office so he couldn't get to me.

About three weeks later going down the hall at headquarters I saw big Joe. He was coming toward me, and if there had been any place to hide, I would have found it, but there was not. So I brazened it out, went up to him and grasped his broad shoulders.

"How's the world's greatest speaker?"

He swelled up.

"Guess how long they kept me on my feet asking questions?"

"Ten minutes," I guessed, very impressed.

"Almost an hour," he said triumphantly.

I tell you that story not to reveal the deviousness of a PR man, but simply to show that any repsonsible railroad officer can make a good talk. Maybe not a fancy speech, but a fact-filled talk about one of the most interesting occupations in the world—railroading. Every person in this room can do it. I am sure quite a few of you already are doing it.

It simply is not possible for the president, a few top officers and public relations men to reach the vast audience that should hear the railroad story. Not should hear, **must** hear.

Legislation can correct some faults

As I mentioned earlier, **more than 150 bills are in the Congressional hopper.** Among them are bills that will help correct the basic fault of our industry, which is the inability to earn a fair return on the vast investments owners of railroads have made and must continue to make. That inability has two main causes—massive government support for other modes of transport, particularly since the end of World War II, and regulation so excessive that it seriously impedes the freedom of railroad managers to manage.

Those bills can go nowhere without legislative support. We here in this room and throughout the industry have to awaken our friends and neighbors. They need to understand that their own best interests are at stake in having healthy railroads. The industrial strength of our country is built on a steel network of rails which are an extension of factory assembly lines all across America. Indeed, all the way to the jungles of Mexico and the great reaches of Canada.

How can we best accomplish this communications task? There is no magic wand to wave to make it all come about. If there are any magicians, they will have to be us. You and me, we and our half-million fellow workers, and an equal number of rail supply people who build locomotives and cars and steel rail and thousands of items needed by railroads. And everyone else who wants to be our friend. So tell the railroad story. Some people may not care to hear it, but you will be surprised at how many do.

Make yourself a pledge that you are going to seek out an audience. Each of you has a gold mine of information, of transportation wisdom accumulated during a busy lifetime. Tell about your own experiences. Sprinkle your talk with anecdotes, lively recollections. Like **Big Joe,** you will be proud of yourself when you do.

Visits of groups to the railroad are of great value in winning friends. I know we have fewer hands now than before, but often a visit to rail facilities can be handled without much trouble.

There are all kinds of groups to reach. How about inviting a Scout

troop? There are adult Scout leaders on every railroad who can be encouraged to bring youngsters to see us. Some of those lads might well become the railroaders of tomorrow. Don't forget the feminine angle, the Girl Scouts and Camp Fire girls. Through those youngsters we can reach appreciative parents.

An important audience is in the high schools. Many teachers appreciate invitations from railroads. Industrial shop teachers in particular appreciate invitations to railroad shops.

I have mentioned the civic clubs and church clubs. They form a vast audience of people who would like to know more about the fascinating business of railroading. And there is a big new group that increasingly is becoming organized—the senior citizens. They are people who grew up with railroads, people who have a natural sympathy for our problems. And they are good letter writers.

Recently a group of commuters, a number of them senior citizens, visited ICG's new PAL center. In our Chicago commuter operation we use a magnetic ticket that is read by the computer in the ticket gate. At the PAL center (the letters stand for Passenger Assistance Link) operators sit before a TV panel day and night. Through a revolving scan they watch gates at 60 separate points on the system.

The commuters watched as one of the operators sent a radio message to a mobile squad car to look in on the four young men sprawled across the gates of the 83rd Street station. Moments later the visitors watched as railroad police lined the young men against the wall, frisked them and released them without incident. It was not a big event, but the visitors were thrilled to learn about the railroad's concern for passenger safety.

The following week several men stopped me and said, "Hey, I didn't know about that tour. When are you going to do it again?"

All over our railroads visits of this kind are going on. They need to be increased.

Protest Lock and Dam 26

Right now we Midwestern railroads are trying to prevent the Army Corps of Engineers from building Lock & Dam 26 on the Missipssippi River near St. Louis. If it is built the present facility will be replaced by one four times as large. The Corps would then have the excuse to rebuild the entire Upper Mississippi River Basin, and thousands of railroads jobs would be lost.

Our figiht can't be won without the help of our employees and our friends in the public. The Corps has tremendous political clout, but dedicated and determined people can stop the Corps. For example, men like our shop superintendent at Centralia, Ill. He is organizing his community to write letters to their congressman to vote against L&D 26. Posters are going up throughout our big car shop and through the yards and shops of two other Centralia railroads. As a result of his effort, the Chamber of Commerce has written a strong letter to the congressman representing Centralia. Store owners are placing other posters in their windows. That congressman is going to know that if he votes for L&D 26, that railroad community won't like him, and congressmen like to be liked.

Organized letter campaigns, visits to railroad facilities, speeches before interested audiences, conversations with friends, and even with strangers—the list of ways of telling our story is inexhaustible.

Years ago as a young freight salesman, I saw chiseled in stone these words of Abraham Lincoln, which I never forgot:

"Public sentiment is everything. With public sentiment nothing can fail; without it, nothing can succeed."

Those are words we railroaders must not forget.

President Ridgeway: Very, very excellent, Mr. Massoth. We certainly appreciate you coming to us today with the message you had for us. Most interesting, I thought. Mr. Bill.

Introduction of James W. Brent

President Johnson: At this time I will introduce Mr. Parker, our Program Chairman, who will introduce our next speaker. Mr. Parker.

Mr. Parker: Thank you, Mr. President. Our next speaker, like Abraham Lincoln, was born in the great Commonwealth of Kentucky. He was born in Lebanon Junction, right on the main line of the Louisville & Nashville Railroad.

He later attended Purdue University. He was graduated in 1949 with a degree in civil engineering.

He started his railroad career as an engineering assistant with the Baltimore & Ohio Railroad at Cincinnati, and later served as assistant division engineer and division engineer at various locations over the System.

Afterwards, he served as regional engineer, engineer of cost and material, and in 1964, manager of planning facilities of the C & O—B & O.

In 1966, he returned to Cincinnati as assistant chief engineer for the Western Region.

Two years later he moved to Huntington as assistant chief engineer of Maintenance.

In 1973 he was appointed chief engineer at Cleveland.

It is my pleasure to introduce to you Mr. James W. Brent, chief engineer, Chessie System. (Applause)

Role of the M/W Supervisor In These Changing Times

By JAMES W. BRENT

Chief Engineer, The Chessie System

Mr. President, honored guests, ladies and gentlemen:

I just found out how I got here. These PR people, you know—and it's a true story. My friend Merwin Dick out there made a little 'phone call a couple of months ago, and before I knew what I was doing, here I am.

Really, I guess he and Ace Parker teamed up on me. And when I accepted their invitation to talk to you a little today about the "Role of the Maintenance of Way Supervisor in these Changing Times," I didn't know how difficult it was going to be to put together.

It's a little bit like explaining the duties of the section gang. You can say it all pretty quickly. They do just about everything that no one else wants

James W. Brent

to do. And the role of the maintenance of way supervisor is just about the same thing. He has always been and will continue to be the backbone of any railroad organization.

We adapt to changes

And with that, I expect I could sit down and you fellows would be just as smart as you will be when I finish this talk. Really, I think I have never heard a better explanation of the railroad situation than Mr. Rice gave us here earlier, and I agree wholeheartedly with everything he said. But as I look back over 26 years of railroading, I really can't remember anything but changing times—and I guess that's progress. Most of us tend to resist any sudden changes that affect what we do or how we do it, but we really have an amazing ability to adapt to change that comes on slowly.

When you consciously start to analyze the environment in which we work today and compare it with that of just a few years ago, you begin to realize how much we are continually adapting to drastically different circumstances.

It really hasn't been that long ago that the 40-foot box car and the 50-ton hopper were the predominant equipment types that you saw operated on our track. Now what do you see? 100-ton hoppers in unit trains, high-cube box cars, huge tank cars, 6-axle locomotives, just about anything else they can get a flanged wheel under. And the ability that you as maintenance of way supervisors have shown to meet and overcome these challenging problems indicates what an outstanding group of people you really are. The job you have done and continue to do is almost unbelievable.

In addition to these physical changes, many things have happened in recent years and continue to happen in our society which have complicated our jobs, created pressures and constraints on our activities and making it essential that we continually reappraise our role in order to function in this changing society.

Aim is to make a profit

The primary responsibility of the maintenance of way supervisor has not really changed since the first railroad was built. Simply stated, he has a responsibility to maintain that portion of his company's property to which he is assigned so that the company can accomplish its goal of providing a transportation service that is satisfactory to its customers and can produce a profit to the owners. This is still our No. 1 job. After all, most companies, or industries, were originally created and started for the ultimate purpose of producing a profit for the owner or owners. The concept of operating any industry as a social function certainly wasn't contemplated by the writers of our Constitution.

I don't have to tell you how tough it has been in modern times for a rail-

road to produce a reasonable profit. We have been forced by government regulations to maintain and operate many miles of marginal or losing railroad lines. Rates have been controlled so we can't adjust to meet changing conditions. And all this has made it next to impossible to properly maintain and operate those lines where we could operate and return a reasonable profit.

Now that these policies and regulations have wrecked many railroad companies, the political approach seems to be more regulation. We must now not only cope with the economic problems caused by not being allowed to implement good business decisions in operating our companies, but we must satisfy the numerous federal agencies and dozens of other alphabetized groups at all levels of government. Your many years of successful railroading is now subjected to review and approval by these agencies working under volumes of rules and directives created completely outside the constraints of the private enterprise system with little or no consideration or recognition of the need of a private industry to return a profit.

As a result of these things, it is imperative that every maintenance of way supervisor not only be better qualified technically, but he must improve his ability to utilize the resources available to him and he must develop some skill and public relations. The previous speaker gave you a pretty good going over about that.

I have a comment here, if you are wondering how this helps you maintain the railroad, well it really doesn't but I think he explained what it can do for us if we are willing to accept the challenge and tell our story.

Much good-maintained track

I get awfully tired of reading all the time and hearing all the time about how poorly maintained track is the major problem of the railroad industry. And that's the reason I accepted this coercion to come up here and talk to you today. I'm not a public speaker, but I think we all have to take every opportunity we can to get up before any kind of group and tell the railroad story in a positive manner and let the people know there is a lot of good, well maintained track in this country, and every railroad problem is not due to poorly maintained track. And that much of that poorly maintained track is there because good business judgment prohibits investment where there is no return.

We should talk about the progress we have made. Tell people about the improved productivity of our people, the new technologies we have developed, and the many other things we've accomplished in spite of the obstacle we have had to overcome.

I know it's difficult for us as practical railroaders to successfully debate with economists, statisticians, editors, but if we learn to tell the story effectively we can affect the public image of our industry. You have done, and are doing, a tremendous job—so don't be backward about telling others about it. It never ceases to amaze me, the limited knowledge of people outside our industry have of the railroad industry, what our problems are and what causes them. And that's nobody's fault but ours. We haven't told our story.

In watching these change of events in recent years, I became convinced that the traditional railroad engineering or maintenance of way organization could not cope with the many non-physical problems being created by all the new regulations and social constraints coming into play and at the same time keep up with the growing physical and technical problems of maintaining the property to safely handle bigger, heavier, and more sophis-

ticated equipment so commonplace today.

Perhaps the best way I can explain how I feel about the role of the maintenance of way supervisor in these chaotic times would be to tell you something about how we have recently reorganized the Engineering Department on the Chessie System, and I think you have to include the entire Engineering Department when you talk about a maintenance of way supervisor.

There were, of course, internal factors influencing our thinking and some of the details of our organization as we set up, but the primary impetus for this change came from the need to create an organization which could adapt more quickly and effectively to the changing physical and social factors. Some of the internal factors we had to consider were relationships with other departments within our company. In recent years the Chessie System has absorbed and coordinated several other roads that make up the System, and our relationships with these other departments changed considerably.

Control was too centralized

In addition to that, the problems of coordinating and controlling the activities within our own Department have taken on a different aspect. We had been, as I believe most railroads had, tending more and more towards centralization of control and direction of most of our work activity. While this centralized control and coordination is desirable and necessary in many areas, there are some undesirable effects. Too much centralization necessarily removes many of the prerogatives of the local supervisor to react to local political and regulatory pressures, to adjust to changing operating demand, it lessens their prestige and creates, in some cases, serious morale problems and very often hinders the development of the initiative of the individual.

One of the major goals of our new organization is to decentralize control over the day-to-day activities of our people as much as we possibly can and delegate to each level of supervision the necessary authority to permit them to exercise their own initiative within the framework of clearly defined company and department policy. We are convinced this will enable our people to adapt more readily to these changing conditions and to deal more effectively with the representatives of the various regulatory agencies and to solve physical problems they are faced with more efficiently.

We also believe that the maintenance of way supervisor, as well as other railroad supervisors, in addition to continually improving his technical ability must develop a broader managerial capability and better understanding of how their actions affect the overall success of their company.

Want to develop managers

In order for them to do this, we have tried to create a new kind of environment for them to function in. Our Transportation Department recently announced a somewhat similar reorganization and in discussing this before the American Association of Railroad Superintendents our Vice President of Operations put it this way:

"No longer do we expect the head of the division to be the one who knows all, sees all, and does all. Instead of expecting him to be a superintendent, we expect him to be a manager. And by being a manager he will control his operations as opposed to merely supervising it. We feel that same philosophy is necessary if we are to run a successful engineering maintenance of way organization.

With the increasing need to improve

our efficiency so our industry can survive as a part of the private enterprise sector while being limited more and more by regulation and constraints which give more weight to social problems than the profit, it is imperative we do a much better job of managing the resources available to us. If we do this successfully, we can live within these regulations and constraints and still produce a profit.

With this in mind, we have designed our organization to stress management as well as supervision. It's absolutely necessary that every level of supervision learn to think in terms of managing and not just supervising.

Managers given staff assistants

In order to stress this concept, we did away with many of the traditional titles. Mr. Pullem was introduced as Division Engineer this morning. He's not division engineer any more. We did away with that title. We call him manager of engineering. He has total responsibility for all engineering, maintenance and construction activities and the utilization of the people on his assigned territory. He has full authority to allocate resources available to him within the established policies and standards. His immediate staff consists of one more engineer of track, engineer of structures, engineer of signal communication, engineer of work equipment, and area engineer.

The supervisor in each area report to the appropriate engineer for day-to-day direction and assistance. The area engineer is in charge of a group of engineers who handle surveys and the development of plans and estimates for coal, industrial development, public authorities, and company projects.

We have nine such divisions on our property and they are combined into three regions. And each of the regions is directed by a general manager of engineering.

The regional staff is very similar to a division staff and can provide direction and support in each of the major areas of responsibility.

The general manager of engineering is in charge on his region and he has the necessary authority to set priorities and adjust resources within his three divisions.

The assistant staff is responsible for tying the whole thing together and being sure we don't start running nine railroads or three railroads. We still want to run one.

Two areas of responsibility

The assistant staff is divided into two major areas of responsibility—design and production. Each is directed by an assistant chief engineer. The Design Section, as the name implies, has responsibility for designing new facilities, providing technical assistance to the field forces as required, and maintaining engineering and property records and for the development and direction of selected major construction projects. This section is subdivided into three major groups—structures—signal communications—and office engineering.

The Production Section is responsible for consolidating maintenance programs prepared by the divisions and the development and control of the maintenance budget and distribution and control of materials.

A staff under the director of engineering programs is set up very similar to the regional and divsion staff, with groups of specialists in tracks, structures, and signal communications, work equipment and materials. Each of these provides support and assistance to their counterpart on the regions and divisions and are responsible for coordinating system-wide activities. They are directly responsible for system plant and shop activities, such as rail welding, equipment repair, reclamation, and so forth.

Established two new groups

There are two other groups on the system staff, which was new in our organization. They each function under a director, who reports directly to the chief engineer.

First is the Administrative group, which has the prime responsibility to articulate and interpret departmental and company policy, develop and supervise employee training programs, handle labor relations and personnel matters, coordinate negotiations with outside parties and supervise the headquarter clerical staff. They are also responsible for special engineering research projects and reports, development and coordination of data process applications in the Engineering Department.

The other group which I believe is unique in railroad engineering departments as a separate function is the Quality-Control section. This group has the responsibility to formulate inspection procedures, develop quality standards and evaluation methods and monitor the activities of all our inspectors to assure that inspections are made and work is done in accordance with the company policy and governmental requirements. They are also responsible for the operation of our track inspection car and the reduction of the data obtained to be useful to each level or section of the Department.

That very, very briefly is how the organization is set up. We think in today's world that the non-technical and non-physical factors that affect our job are going to continue to change and force us to make decisions and take actions that are not necessarily based on good engineering or business judgment, and we believe that the broader development of the managerial capability of our people will enable them to weigh the total effect of such decisions or action upon the profitability of the Company and follow the best path from the total company standpoint.

Top man is a manager

In addition, the technology in each of the major areas of our responsibility is still changing rapidly. We cannot really expect the top man on a division to be expert in all these areas to the extent that he can properly direct and instruct the people involved in the day-to-day work activity. Therefore, the top man must be the planner, coordinator and the decision maker. In other words, the manager. In order to do this he must have the authority to manage and he must have a staff of qualified people in each of the area specialties to advise him.

The most important and expensive problem we all face is that of maintaining track adequate to safely support the new and sophisticated equipment being operated. There is a great need for more understanding of the technical requirements at the Supervisor's level and a closer adherence to specifications and standards. "Seat of the pants" railroading doesn't work any more.

We believe that the assignment of a qualified engineer of track to work closely with the track supervisor will enable us to provide the technical knowledge and direction necessary. We can provide better training and educational programs for these people and through them get this knowledge to the people actually doing the work in a more timely and comprehensive manner.

Provides opportunity for advancement

This is true in all areas of maintenance. Equipment procedures are becoming more and more complex and sophisticated and the first line supervisor must have better technical training and direction in order to properly

handle his job. Our organization is designed to develop this expertise in each major discipline. It is also designed to provide the individual employee with greater opportunities for advancement, either as a specialist in his particular field or if he has the desire and the aptitude and the opportunity to advance as the manager of the overall operation.

We are very optimistic this broadened area of general responsibility and continued development of specialists in the specific areas will provide an environment which will encourage the growth of individual initiative and independent thought. This is the only way new ideas can be translated into productive reality. The opportunities we provide for the development of people and ideas within our own Company and the continued free exchange of the knowledge required through organizations such as this one offers the best chance for the survival of the railroad industry as a private enterprise.

I would like to leave you with this thought. The future of the railroad industry may well depend upon how you, the maintenance of way supervisor, meet the challenges and the opportunities that you will face in the next few years. Thank you. (Applause)

President Johnson: Thank you, Mr. Brent. We are very interested in your new organization. We appreciate your coming. Stay right with us.

Our registration at eleven this morning—Roadmasters, total, including associates and guests, 303. B & B—total of 87; Others—39. Total registered at 11 A.M. of 429. I feel, with the situation as it is today, that is pretty good. We hope to have more.

I would like to mention at this time, I noticed quite a few men from the Supply Association, REMSA, are with us this morning. Glad to have you. And we invite you to our sessions in the afternoon, the B & B, and also, the Roadmasters. Glad to have you.

Also, I would like to mention for our railroad people that last year, our President, Mr. Autrey, installed a system whereby a certain number of a railroad company was designated as sort of a check on his crowd to be sure they attended all the sessions, and look around. He has graciously installed that system again this year, so it's in effect again this year, gentlemen.

The Roadmasters will convene at 1:30 this afternoon in this room. The B & B will convene at the same time to our left. We'll adjourn until the afternoon sessions.

. . . Recessed at 11:30 A.M. . . .

AFTERNOON SESSION

September 15, 1975

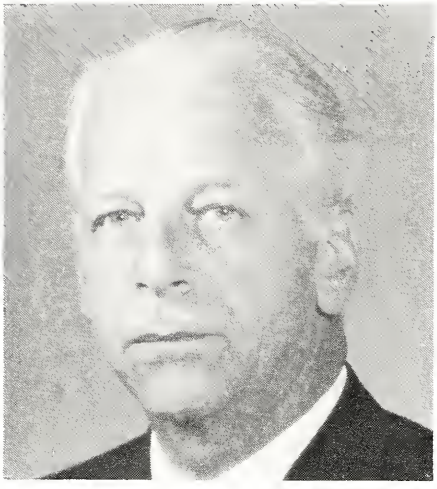
President Ridgeway: I hereby now call this 80th Annual convention of the American Railway Bridge & Building Association to order, and I offer a cordial welcome to this our 40th consecutive meeting in Chicago.

As has been our past practice, all guests and visitors are especially welcome to attend any and all our sessions. May I also extend a sincere invitation for all the ladies to attend any of our sessions that may hold an interest for them. You are reminded that you should urge your lady to register and participate in the program arranged for her. I am certain she will enjoy the socialability and the excellent program.

President's Address

By JOHN J. RIDGEWAY

Director Engineering Services, B&LE, Greenville, Pa.



John J. Ridgeway

The last paragraph of Section 6 of the By Laws of our Association states that, "The President shall present a report containing a statement of the general condition of the Association." There are two areas that need to be covered. One is our membership; the second is our solvency. Our membership would indicate that we should be concerned. There has been a decline in our numbers from a high of 968 in 1962, to the present 700+. This decline does seem to be related to the decline in total railroad employment. Whether this is a straight-line relationship, I do not know ,nor do I consider it that pertinent. Of more immediate concern should be the apathy of the great majority of our Association membership. It is only through an active participation by a great number of members can our Association better serve the railroad industry.

Get involved

Let me digress from my present presentation for a few moments. Seven years ago I became involved through active participation in the American Railway Bridge & Building Association. This involvement permitted me to attend executive board meetings in various parts of the country; such as landing at an airport in a driving thunderstorm, as well as several other most unpleasant flights. However, these were very minor irritations compared to the benefits which I received personally through my involvement with the Association. The many, many good people that I have met and the many friends I have made by far outweigh the personal time that I spent on Association business. What I am trying to say to you is become involved. Give to your Association.

The program being offered this year contains four special subjects of your choosing. A card containing selected topics was mailed to each member approximately one year ago. The card asked that you select the topics you wished discussed at this meeting. You were also asked to indicate subject materials that you were interested in for next year's program. The response was most disappointing. This lack of participation only adds to the burden of the Executive Committee in presenting a program that is interesting and educational. Soon now another such card will be in the mail to you. I urge you

and plead to you, please do not lay them aside, fill them in immediately and post them back to our headquarters. I am asking you to become involved for your good and that of our great Association.

Advertising income on rise

Now to the other area I mentioned earlier. Financially we find our Association to be sounder than ever. Our advertising income continues to rise. At this time the Executive Committee does not deem it necessary to raise the dues above the present seven dollars, which has been in effect since 1965. In these days of spiralling costs, this is quite an achievement of stability. A complete financial report will be given at the business session Wednesday morning.

I have been referring to the Executive Committee, at this time let me introduce them to you. I ask that each member stand as he is introduced and remain standing until all members have been introduced. Please withhold your applause until the end of the introductions.

Starting with our Junior Directors and in alphabetical order:

Mr. J. Payne, division engineer, Frisco, at Memphis. Jim is chairman of our resolutions committee. He is also sponsor of special subjects report No. 2.

Mr. F. B. Lindsay, Jr., general bridge inspector, Southern, Greenboro, North Carolina. Brooks is a member of the resolutions and ladies entertainment committees. He is also sponsor of special subject report No. 3.

Mr. M. Noyszewski, bridge engineer, ICG, Chicago. Stan is chairman of the registration desk committee. He is also sponsor of special subjects report No. 1.

The intermediate directors are:

Mr. W. E. Brakensieck, assistant chief engineer, St. Louis, Missouri Pacific. Bill is chairman of the public relations and convention greetings committee.

Mr. O. C. Denz, supervisor building maintenance, Milwaukee Road, Chicago. Omar is sponsor of special subject report No. 4, and he is a member of the membership committee.

R. C. McMaster, engineer facility & structures, B&LE, Greenville. Ray is chairman of the advertising committee, one of the most important.

Our three senior directors:

Mr. J. W. Davison, assistant director bridge engineering, BN, St. Paul. Jim is chairman of another important committee—membership.

C. A. Hughes, assistant engineer bridges, SP, San Francisco. Cal is chairman of the necrology committee.

Mr. W. R. Hyma, bridge engineer system, Santa Fe - Chicago. Walt is chairman of the ladies entertainment committee.

Third Vice-President, Mr. J. C. Hobbs, assistant chief engineer, RF&P, Richmond. Jim is sponsor of standing committee No. 1.

Second Vice-President, Mr. W. H. Rankin, senior structural engineer, Frisco, Springfield, Mo. Warren is chairman of the special subject committee and is responsible for much of the excellent program that is to follow.

First Vice-President, Mr. J. R. Williams, engineer bridges, Rock Island, Chicago. Jack is sponsor of special subject committee No. 2.

Mr. E. E. Runde, manager of construction, ICG, Chicago, Immediate Past President. Erv is chairman of the Ad-Hoc committee on B&B foreman training.

Mr. W. H. Huffman, assistant vice-president and chief engineer (Re tired) CNW. Heinie is our treasurer and one of our Past Presidents.

Mrs. Ann Wilson, is unable to be here at this time because of her other

duties. She will be present at our business session on Wednesday morning. I am sure that all of these gentlemen agree with me when I say that Ann is the most important link in our organization and runs a taut office in a most pleasant manner. (You may now applaud).

Thank you, gentlemen, you may now be seated. At this time, may I take a moment to recognize three other very dedicated gentlement who contribute so much to our Association. I am sure it is not coincidence that they are all Past Presidents.

Mr. W. F. Armstrong, engineer buildings, CNW. Bill was President in 1968-1969. Bill is chairman of the hotel arrangements committee, a very large job in itself. He also is chairman of the publications committee and publishes our quarterly newsletters. He also is our representative on the joint associations committee with representatives of the roadmasters and superintendents. Please stand and be recognized, also accept our thanks.

Mr. M. H. Dick, vice president and editor of Railway Track and Structures. Merwin was President in 1958-1959. He has been chairman of our convention program committee for many years and has been responsible for obtaining many of our outstanding speakers. Will you please stand and be recognized.

Mr. R. E. Dove, was President in 1941-42. Bob has for many years published our annual proceedings with outstanding success.

Recognition of past presidents

Next is one of the highlights of this program. The recognition of those past Presidents who are here with us today. One of this select group will make the presentation at this time. Will Mr. Runde please come forward.

E. E. Runde: The oldest Past President we have present is Mr. R. E. Dove, who was president in 1941-42. Next, in order of seniority, is Mr. W. H. Huffman, who was president in 1957-58. Next, is Mr. M. H. Dick, who was president in 1958-59. Then we have Mr. E. R. Schlaf, who was president in 1963-64. Next is Mr. H. M. Wilson, who was president in 1965-66. Next to him is Mr. R. D. Hellweg who was president in 1966-67. Next is Mr. J. W. DeValle, who was president in 1967-68. Next is Mr. W. F. Armstrong, who was president in 1968-69. Next is Mr. T. L. Fuller who was president in 1971-72. Next is Mr. N. D. Bryant who was president in 1972-73. The lowest in seniority is myself. I was president in 1973-74.

President Ridgeway: Thank you Erv. It is good to have these gentlemen with us.

I was informed just recently that Lee Mayfield, who was president in 1953-54, passed away.

We have now come to the time for the presentation of our reports. The first will be special subject No. 1. This committee is sponsored by Stan Noyszewski, who will introduce the chairman and the committee.

M. Noyszewski: Are all members of Special Subjects Committee No. 1 who are present up here on the platform? Very well. The chairman of this committee is Mr. J. G. Robertson, who is manager of engineering design for the Bessemer & Lake Erie at Greenville, Pa. Mr. Robertson.

Trends Toward Bridges Built with Combinations of Timber, Concrete and Steel Components

Report of Committee

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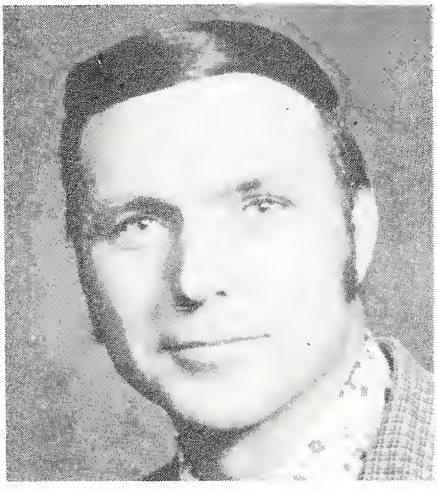
Today there is a definite trend toward bridges being built with a combination of timber, concrete, or steel components, and with this thought in mind, we would like to discuss with you just what is being done by the various railroads throughout the United States. Practically everyone is familiar with the type of bridges that are constructed using mainly one type of material, such as, in a timber trestle or a steel viaduct, so we will confine our discussion to the more unusual type of construction and to bridges built with a combination of materials. Existing bridges can also be repaired or strengthened by the use of alternate materials, and we will try to show you some of the ways that this is being done by various railroads.



J. G. Robertson

Economy is the goal

The main goal of all bridge personnel, when designing a new bridge or planning to repair or replace portions of an existing bridge, is to obtain a structure that will have the required service life at the lowest cost. However, before anyone proposes to do this work, they should look into all avenues, as to the availability of materials, and how much it will cost to construct the bridge using alternate materials, because the costs of material and labor have sky-rocketed over the past few years, and because of the availability of some construction materials. Large timber members are difficult to obtain

and at times, there has been a shortage of steel. This would imply that concrete is the answer, however, you may want to replace just portions of a timber trestle or a steel bridge, and then you may have a choice of using alternate materials. Therefore, we would like to discuss with you just how you might go about constructing some of these bridges by using a combination of materials, and maybe some new ideas will be gained here during this discussion, for replacing existing bridges or constructing new ones.

The use of any one particular material doesn't necessarily limit the capacity of the bridge to any loading, although each material does have its limitations. Under certain conditions, timber can support an E-80 Cooper loading just as well as steel. Therefore, the design for the bridges on your railroad should be determined by your Chief Engineer who may wish to design for something less than the recommended E-80 Cooper loading for a branch line or he may want to design for a heavier loading, if the bridges are near a steel mill and handling heavy ladle cars. However, the material to be used will probably be governed by other factors, such as cost, availability, location of project, etc.

What kind of deck?

To discuss the different combinations of materials that may be used in a bridge, let's assume that you were told to construct a new bridge on a main line. The first thing that you would want to know is whether you should go to a ballasted deck or an open deck bridge. Since you should always look at the bridge with the idea of having little or no maintenance on it, an all steel or concrete bridge with a ballasted deck is probably the best choice, but this is probably the most costly type of construction. A bridge on a main line might warrant this cost. However, you may have second thoughts about constructing this type of bridge on a branch line.

After it has been decided what type of deck to be used, then you should look into the different methods of holding your ballast or supporting your bridge ties, as this may have a bearing on the type of superstructure and substructure. However, before the substructure is designed, a soil analysis will probably have to be made in order to determine whether you will be supporting the bridge on piling, on rock, or maybe on some kind of spread footing. If it's on piling, you will want to know whether you were going to use friction piles or end-bearing piles. If you have good soil conditions and plan to design for a spread footing, you have to think about getting concrete to the site. Several railroads are using precast concrete foundations and abutments which are supported on piling, regardless of whether they are end-bearing or friction bearing piles.

Another choice is to use some type of piling that would be part of your bents or piers and even support your back wall. These pile bents could be constructed using timber, concrete, or steel or you could use steel shells filled with concrete. This type of substructure requires diagonal bracing on each set of piles and the type of pile will determine the difficulty in attaching the bracing.

It is suggested that when constructing pile bents, the distance from the ground line to the base of the rail be limited to about 35 feet, however, 20 feet seems to be the average height. Pile bents exceeding 10 feet in height also require bracing in the longitudinal direction. Some railroads place a concrete collar around the bents at the ground line for additional stability and then place the diagonals above that.

You have another choice to make when you think about what kind of cap

you are going to use to support your beams. Here again, you could use timber, concrete, or steel. Many railroads are using pre-stressed concrete caps, which are suitable for new construction or for replacing timber caps. These are more readily available than timber, however, they are heavier and more expensive. A timber cap is not recommended unless the piling is timber, and then this would only be used on a light duty line, because of the availability of timber, and the fact that timber is not capable of supporting heavy loads perpendicular to the grain.

One thing you have to bear in mind, in choosing different materials to construct your pile bents is how you are going to fasten the different component parts together. This is more of a problem when using concrete, because you have to form your bolt holes or drill them in the field at the risk of hitting rinforcing bars. Concrete caps can be fastened to timber piles by the use of drift pins through precast holes in the caps. Another method is to fasten angles on the sides of the caps at the location of the piles.

Good delivery of glu-lam

More decisions are necessary when you are planning your superstructure. Pre-stressed concrete or steel beams would probably be used. However, glu-lam beams are now being used throughout the country. Glu-lam beams can usually be delivered within one month, and they are as easy to install as solid sawn timber. They can also be treated with creosote with almost complete penetration. The disadvantages of glu-lam beams is that they are more expensive than solid sawn beams, they are manufactured only in certain sizes, and they present a fire hazard. Because of the limited sizes available, they should be limited to new construction. The use of pre-stressed concrete beams has the advantage that they are usually available on a fairly short notice. However, one of the disadvantages is that they are heavy and are probably more costly than some of the other materials available.

Steel has been used extensively throughout the country because of the number of structural shapes available for intermediate spans, and it can be easily fabricated into plate girders and trusses for longer spans. A-242 or A-588 steel is being used to eliminate painting, but the weathering action of the steel will stain any concrete work below. If the appearance of the concrete is a matter of concern, a silicone sealer can be used to protect the surface of any exposed concrete.

Some railroads have been using rail sections on spans 10 feet to 14 feet in length, and these are used for either an open deck or a ballasted deck. Four rails per running rail is usually used for an open deck, but a ballasted deck usually requires six rails, because of the added dead weight. These rails can be encased in concrete which, when reinforced, provide a deck for holding your ballast. This type of construction has the advantage of giving you more headroom under the bridge, if you have a clearance problem.

Retaining the ballast

After deciding whether you are going to use timber, concrete, or steel for your beams, you will have to decide how you are going to hold your ballast, if you want a ballasted deck. The use of prestressed beams or slabs lend themselves quite readily to the ballasted deck, because you already have your support work in your beams. However, if you decide to use timber or steel beams, you will have to put some type of deck on them in order to hold the ballast.

Here again, you have a choice of what type of material to use. A timber

deck can be used for a bridge that might not warrant the use of concrete because of traffic density. A concrete deck can be installed by either casting the concrete in place, or by using pre-stressed slabs. Concrete seems to have the advantage over a steel deck, in that it prevents the ballast from walking around under the ties. You also have less local vibrations with a concrete deck, which cuts down on the fatigue failures in steel stringer and floor beam connections. A ballasted deck also permits a 10% reduction in your impact. However, this reduction may not outweigh the added costs of the extra support work needed for the ballast.

If you decide to use pre-stressed slabs on steel stringers, it is suggested that you use some type of abrasion pad between the concrete and the steel to prevent wear on the top flanges of the stringers. Pre-stressed slabs can be fastened down to steel beams with normal bolts, such as used when fastening down timber bridge ties. If the concrete deck is cast in place on steel beams, the composite action that might develop between the two materials is not used in the design calculations, unless shear connectors are used.

Deck drainage

Regardless of what method you use to support your ballast, you will probably want to provide some means of getting rainwater off the deck. If you are casting your concrete in place, you could install some type of drain in the slab to drain the water down to the ground. If you are using timber planks or pre-cast concrete for the deck, you will probably want to lay down a layer of butyl membrane with some type of protection course above, to prevent the ballast from puncturing holes through it. Some railroads also place a layer of 60-pound felt below the butyl membrane to provide for any uneven surfaces.

The backwalls for a bridge can also be of different types of material, if the bridge is constructed using pile bents. Timber planking is probably the least expensive, however, they will rot out eventually and cause a maintenance problem. Precast concrete slabs or sheet piling placed horizontally can also be used to give a more permanent installation.

In closing, you have a lot of choices when replacing portions of an existing bridge or constructing a new one. Site conditions may restrict some of your choices and construction equipment and procedures on your railroad may restrict others, but it is hoped that you have gained some new ideas for future bridge work on your railroad.

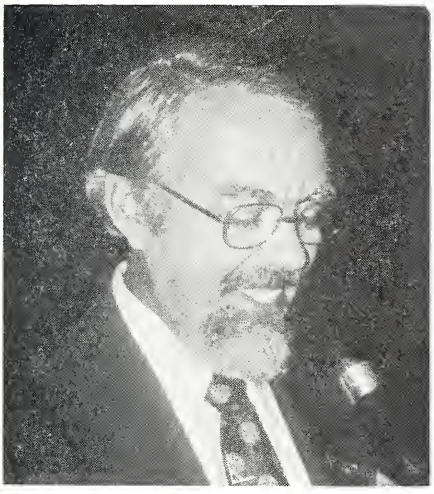
President Ridgeway: Thank you, Mr. Noyszewski and Mr. Robertson and all the members of your committee for the fine report you have prepared and presented.

The next item on our program is a presentation on "Renewal of Timber Decks on Steel Bridges with Epoxy-Bonded, Prestressed-Concrete Slabs." The presentation will be made by Mr. W. A. Hyma, bridge engineer-system, Santa Fe Railroad, Chicago. Mr. Hyma is also one of our senior directors. Mr. Hyma.

Renewal of Timber Decks on Steel Bridges with Epoxy-Bonded, Prestressed-Concrete Slabs

By W. R. HYMA

Bridge Engineer-System, A.T.&S.F., Chicago



W. R. Hyma

Out of 220 miles of bridges on the Santa Fe, about 32 miles, or 171,000 lineal feet, are steel-deck girder spans with timber-ballasted decks. Most of these spans were erected in the late 1890's or early 1900's with open decks and then converted to ballasted decks about 20 years later. Hence, many of the present decks are 50 to 60 years old.

The use of ballasted-deck construction is highly desirable from a track-maintenance standpoint, but it does create some added bridge-maintenance problems. In addition to the replacement of the decks themselves, the top flange of the girders and the top lateral bracing system of the spans, which are usually wet with moisture coming through the ballast and held by the deck timbers, are subject to heavy corrosion since they are not accessible for cleaning and painting. The resultant loss of section can eventually require a very expensive replacement of top cover plates and top lateral bracing. The repainting cycle on other surfaces is also shortened because of the mud and water draining from the ballast, combined with the poor ventilation inside the span.

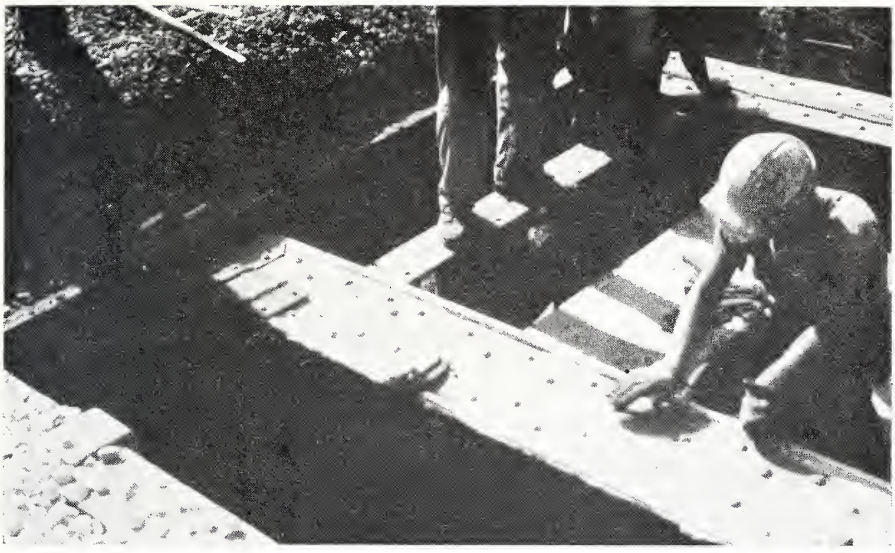
Promising experimental program

An experimental program of renewing the old timber decks with precast, prestressed concrete slabs bonded to the steel with an epoxy grout was initiated on the Santa Fe last year, which promises to solve most of these problems. The transverse joints between slabs are also epoxy bonded so that a monolithic, water-tight deck results. The concrete is prestressed to achieve a minimum depth and to provide a crack-free slab under service loads, which should have a considerably longer life than the timber it has replaced.

The watertight surface protects the steel and should greatly extend the painting cycle. The lateral rigidity of the monolithic deck eliminates the need to strengthen or replace the corroded

AFTER THE TRACK, ballast and old timber deck have been removed the top flanges of the girders are cleaned to white metal using two sandblast units powered by 375-cfm compressors.

lateral bracing systems. Finally, the composite action achieved by bonding the concrete slabs to the steel girders strengthens the span to an extent that coverplate renewal will not often be required. Stress tests performed last year with SR4 strain gages before and after the renewal of timber decks with the bonded concrete slabs showed that the measured stresses, even with the additional weight of the concrete, were reduced by 100% for the top flanges



AFTER SANDBLASTING, narrow plywood screeds are bonded along the edges of the cover plate using an epoxy gel. The thickness of the screeds is equal to the height of the rivet heads.

STIFF but flowable grout made of epoxy and dry silica sand is poured on the top flange and struck off level with the screeds. A slight excess of grout insures a fully-bonded contact.

and by 11% for the bottom flanges, which agreed quite well with the theoretical values predicted by calculations. However, since the epoxy bonding does not meet the requirements of the design specifications for develop-

SLABS ARE SET in position by locomotive crane with a 50-ft. boom. Bottom surfaces and edges of slabs that are to be bonded with epoxy are given brush-off sandblast just before placing.

TRANSVERSE JOINTS between slabs are sealed with epoxy gel and filled from atop with sand-epoxy grout. Treated-timber ballast curbs are installed and secured, using galvanized hardware.

ing composite action, no increase in rated capacity will be assigned on this basis, at this time.

The 8-ft. by 14-ft. by 8-in. thick concrete slabs, weighing about six tons each, are designed for Cooper's E80 loading and are obtained from a commercial prestressing plant located on the Santa Fe in Albuquerque, N.M. Ten slabs a day can be produced to very close tolerances on a long casting bed with steel forms set up for steam curing. The air-entrained concrete has a strength of 4000 psi at transfer of prestressing force and 5000 psi minimum in 28 days. Slabs are cast upside-down so that the dense steel-formed surface will be on top after erection for maximum water resistance, and the rough-broomed surface will be on the bottom to give the best possible bond with the epoxy grout placed on the top flanges of the girders. Threaded inserts are cast in the slabs for erection handling and for curb and walkway fastenings.

Slabs are shipped to the bridge site on flat cars and are unloaded on the shoulder of the fill off the bridge end with a locomotive crane. All spans redecked last year and this year have been in double-track territory where it has been possible to take one track out of service.

After removal of the track, ballast and old deck, the top flange surfaces are cleaned to white metal using two sandblast units powered by 375-cfm compressors. Thin strips of 5/8-inch plywood are then bonded along each edge of the top cover plate with an epoxy gel. These strips or screeds allow a layer of a silica sand-epoxy grout to be poured over the entire top cover-plate surface to a depth equal to the height of the rivet heads projecting above the cover plates. A slight excess of the flowable grout is used so that it is extruded by the weight of the slab as it is placed to insure a fully bonded contact surface. All epoxies used are moisture-compatible so that the work can continue in wet weather but temperatures should be above 50 deg. F. to insure reasonable curing times. Mixing of the two epoxy components and the dry sand is done using 5-gallon pails and electric-powered mortar mixers.

Placing the slabs

As the slabs are placed, the transverse joints between slabs, which are tight at the bottom and open ¼ inch at the top, are sealed under the deck and up the sides with the epoxy gel. The joints are then filled from the top with a pourable sand-epoxy grout. The initial set-up time of the epoxy grout varies with the temperature, but takes place in about four hours during the summer months.

Treated-timber ballast curbs are then bolted in place using galvanized hardware. Deck anchors using spring compression clips are placed at 4-foot centers along the girder flanges to provide lateral restraint if the epoxy bond between steel and concrete should ever break down. Track panels are replaced on blocking, ballast is replaced, and traffic is restored.

Production thus far has averaged about 25 track-feet of deck replaced per day. With techniques now under consideration and with faster curing epoxies, the procedure will be extended to single-track territories next year with a goal of renewing 40 feet of deck per day with the track out of service for no more than 8 hours.

Material costs for the epoxy-bonded concrete-deck system have been about 25% higher than renewal in-kind with timber. Labor costs are approximately the same since the top flanges would be sandblasted and painted before replacing a timber deck. Considering the alternative costs of cover-plate renew-

al, lateral system repair, and more frequent painting, however, the concrete deck offers important savings in the long run.

President Ridgeway: Thank you Mr. Hyma for your excellent and informative report.

Report of special committee No. 2 will be next. This committee is sponsored by Jim Payne who will introduce the chairman and committee members. Mr. Payne.

Mr. Payne: The next report is on "Fire Protection Systems for Bridges and Buildings." Mr. W. E. Halley, manager fire protection, North Western Railway, is chairman. Mr. Halley.

Fire Protection Systems for Bridges and Buildings

Committee Report

COMMITTEE—W. E. Halley, *Chairman*, mgr.fire prot., C.&N.W., Chicago; C. V. Fetters, gen.fore.b.&b., S.L.-S.F., Cape Girardeau, Mo.; E. R. Schlaf, supt. fire prot., I.C.G., Chicago; A. G. Shore, gen.mgr., Ocean Ctgs., Vancouver, B.C.; A. J. Tiesling, b.&b. supvr., C.&N.W., Madison, Wis.; and J. C. Vanderhaar, asst.dir.ins., Sou., Washington, D.C.

A railroad's success depends on its preserving the continuity of its various operations. Railroad bridges and buildings must be planned, constructed, and operated not only for efficient operation but also for the continuity of production—and as immune as possible to the destructive effects of fire, wind, or derailment perils.

Many business organizations have not been able to survive a destructive fire even though they were completely insured. Business destruction results in loss of markets and customers, failure to deliver a product, and loss of skilled employees because employment is interrupted. This is not entirely the case on a railroad because of protected jobs, but a loss of vital bridge or shop can disrupt the operation of even the most efficient operating railroad. The impact generally extends far beyond the railroad itself. All customers, vendors, and stockholders are affected.

W. E. Halley

The recent economic situation, as far as railroads are concerned, has made it difficult to approve any major capital expenditures to provide fire protection for practically any type of facility. However, the text of this report deals with what is available, and what different railroads have done to solve their particular problems.

I. Fire protection for bridges

In making this study, I looked back into some old drawings to find out what kind of standards we used in the past. After searching through some of the files I found we had very little experience in providing any type of fire protection for bridges. One drawing, dated 1911, describes a metal covering over the bridge deck illustrated by this slide. This same concept was in a recent magazine article in regards to fire protection provided by the D&RGW Railroad to provide fire protection for the bridge over the Pecos River. This was accomplished by use of collector pans manufactured by the Armco Steel Corporation. The collector pans are used mainly for drainage around refueling areas, but the D&RGW found it adaptable for the purpose of providing fire protection to the bridge deck.

Ballast-deck bridges and trestles do not seem to be a problem since there is very little wood exposed to the possibility of engine or brakeshoe sparks. However, in timber trestles a fire can sometimes completely burn the entire length of the trestle if some type of fire wall or fire stop is not provided. I have a slide that shows a fire wall which was used by the Burlington Northern which has a double wall separator filled with rock wool. There are other ways to approach this problem by providing concrete pilings at several intervals dividing the trestle in sections.

Weed control is a constant problem around wood-pile bridges. A good program of weed cutting and clearing all the vegetation that would expose the wood timbers is necessary for all main lines. Herbicides have proven to be effective to control vegetation. There are many kinds on the market, but because of the toxicity of the chemicals care must be exercised in the handling of these chemicals around streams or waterways.

There are a number of companies that make fire-retardant-impregnated timbers with Underwriters Laboratories' Labels. The timbers have pressure-impregnated mineral salts in the wood which gives them a fire-retardant quality. To obtain the necessary fire-retardant quality, the minimum chemical retention is 2.5 pounds/per cubic foot to qualify for a U. L. Label or Factory Mutual approval.

Another method of providing fire protection to bridge trestles is fire-retardant coatings. A fire-retardant coating is intended to delay an ignition. The coating may be applied by trowel as a thick plaster or by brush, spray, or roller. The protection afforded is generally proportional to the thickness of the application. When exposed to high temperature, intumescent fire-retardant paints form an insulating blanket which retards surface ignition and reduces the burning rate of a combustible material on the coated sides. These fire-retardant coatings also are excellent for providing fire protection to structural steel members which are subjected to the relatively high exposure temperatures actually observed in fire tests. These coatings can keep the steel temperature below 1,000 degrees F. for at last 15 minutes. It is necessary to strictly follow the manufacturer's instructions and specifications for application if they are to be effective.

Electrical-detective signaling systems are available to detect and give the alarm for fire. The systems are classified in four groups: Central station,

proprietary, local, and auxiliary. A central station system is independently owned and receives signals at a constantly attended station not on the protected premises. A proprietary system is similar but is owned or leased by the protected property. A local system is owned and operated by the protected property but does not have an operator in constant attendance as a central supervising station. An auxiliary system is one that automatically transmits an alarm over the municipal fire-alarm system. Local or proprietary systems are often auxiliarized by wiring to a city-connected master fire-alarm box.

The type of detector which would be best adaptable for a bridge would be a line-type fire detector. A line-type fire detector is a miniature electrical cable which is sensitive to heat every inch of its length. It would be run down the length of the bridge to be protected and is quickly operated by heat which always rises in a fire. It is also responsive to conditions of excessive heat which might lead to a fire if not corrected. The cable has two spring-steel conductors with a thermal plastic or heat-sensitive insulation. The insulated conductor are twisted together, spirally wrapped with a protective tape, and further protected with a lacquered braid. The spring tension in the conductors exert a continuous pressure on the insulation. At the critical or operating temperature the insulation yields to the pressure, permitting the conductors to move into contact with each other and operate the alarm. This action takes place at the first heated point, anywhere around the cable.

The main thing to remember about any type of fire-alarm system is that a fire-alarm system has never extinguished a fire. If the alarm rings to an unattended location, the alarm system is worthless.

Drift, a fire hazard can be controlled by providing adequate nosings to the bridge pilings. The nosings cut the waterflow and reduce the chance of driftwood from collecting on the bridge pilings.

To give you an example of these various features that I have discussed for protection of bridges, I would like to relate an experience of the Southern Railroad for the 5½-mile Lake Pontchartrain trestle which includes practically all I have discussed, plus a few more features that you may find interesting. They have a 2-120-gpm @ 80-psi centrifugal pumps mounted on special Fairmount M-19 motor cars which include all required fire-fighting equipment. The pumps are fully portable and they can be removed from the motor cars and carried by hand to any location. In addition, they have two fire boats equipped with a monitor nozzle at the bow of the boat which is connected to a gasoline-powered pump that draws directly from the lake. When the fire boats are out of service and at other special times, the trestle is patrolled hourly, and 10 minutes behind each train, from 4:00 p.m. to 8:00 a.m., Monday through Friday, and around the clock on Saturday, Sunday and Holidays. The motor car carries one 30-pound dry-chemical extinguisher, one five-gallon-pump tank extinguisher, and one fire pail with a rope.

An agreement with a helicopter service is provided for water drop operations in the event that the fire involves the trestle. Helicopters are based at Morgan City, Louisiana, approximately one hour's flying time from Lake Pontchartrain. A 150-gallon-capacity water-bucket sling, which is property of the railroad, is stored at the heliport facility in New Orleans. The fire-fighting operations by helicopter are limited to daylight hours only.

A line-type fire-alarm system is attached to each side of each stringer of the entire length of the trestle. In event of a short circuit caused by melt-

ing of the insulation on the wire, an alarm bell and flashing red light is activated at the north end of the bridge. There is a bridge tender on continuous duty to receive the alarm. Location of the fire on the trestle is indicated by zone lights at the control panel. The system is operated by a group of 9-1½ volt batteries, and the batteries are kept charged for emergency stand-by service. In case of a commercial power failure the batteries are capable of keeping the detection system operative for three to four days.

II. Fire protection for buildings

Late last year a questionnaire to the NFPA Railroad Section was sent to find out what the railroad industry is doing about protecting their investments in buildings and/or special hazards in the last five years. I received a response by 14 railroads which installed a total of 44 systems, of various kinds. The types of systems installed were as follows:

(1) Automatic sprinklers—22
(2) Carbon dioxide—9
(3) Dry chemical—2
(4) Foam—1
(5) Halon—8
(6) Automatic fire-alarm system— 2

Although half of these systems were automatic sprinkler systems, Halon 1301 (Mono Bromotrifluoromethane) is emerging as a favorite for the protection of electronic data-processing facilities, CTC centers, or other vital electrical equipment. It is interesting to note that although Halon is one of the best extinguishing agents for flammable liquid hazards, no Halon systems were reported as installed to protect this type of hazard. The advantages of Halon make it very compatible for the railroad industry. Cost of these systems will sometimes make it difficult to convince management, but the cost of even the smallest fire in an electronic data-processing center would cost far more than the Halon system itself. Since nearly all railroads depend on the uninterrupted operations of their computer facilities, it makes it imperative that these facilities are protected. It was also interesting to note from the survey that many companies are spending large sums of money for fire-protection systems for older buildings. Many of the buildings were 50 years old or older.

Many of these systems were installed in new construction, which indicates that the railroad industry is becoming more aware of the fire hazards, and wishes to protect their investments.

First aid fire protection

Since in most cases, fire protection is provided in shops and railroad buildings by fire extinguishers, I will discuss the different types commonly used in the railroad industry.

Modern, portable, fire extinguishers contain a limited supply of fire-extinguishing agents. They are small enough to be carried by hand or moved easily on wheels. In countless instances extinguishers have proven their usefulness by extinguishing small fires that have not spread beyond the capacity of extinguishing units available. It is important the appropriate extinguishing agent be used for the type of materials burning and that it be applied properly.

While portable-type extinguishers cannot be a substitute for major fixed extinguishing equipment, such as automatic sprinklers, foam, and carbon-dioxide systems, they can and do provide a strong initial effect on fire. Portable extinguishers are called "First Aid" appliances. In properties equipped with both fixed extinguishing systems and portable extinguishers, the latter often figure prominently in extinguishing fires before they develop the

temperatures or other conditions required to actually operate the fixed equipment.

Fire extinguishers are available for all three major classes of fires. Class A fires are ordinary combustible materials such as wood, paper, etc. Class B fires are flammable or combustible liquid fires. And Class C fires are electrical fires. Class D fires do not concern the railroad industry as they are burning metal fires.

The principle types of portable extinguishers are: water solution, which consists of plain water, or an antifreeze solution is available for water-type extinguishers in areas subject to freezing. Foam is a solution of aluminum sulfate and sodium bicarbonate plus a foaming agent and stabilizer. Carbon dioxide is a liquified compressed gas. Dry chemical is the ordinary type for Class B and C fires and has a sodium bicarbonate or potassium bicarbonate base which is specially treated to prevent caking of the chemical. There is also available a multi-purpose dry chemical for A, B and C fires which is an ammonium phosphate base. Vaporizing liquid extinguishers use a carbon tetrachloride base, which vaporizes when exposed to fire, and the fumes will extinguish a small fire. However, these types of extinguishers are illegal because of toxicity of the fumes in most states and are no longer manufactured.

A small hand hose connected to the water supply may often fulfill the same function as a water-solution extinguisher. On the other hand, the hand hose has the advantage of providing a continuing flow, whereas an extinguisher may soon be exhausted.

The installation of portable fire extinguishers is outlined in Pamphlet No. 10 of the National Fire Protection Association, which has also been adopted by OHSA. The general rules are: water type extinguishers should be spaced at one extinguisher for every 3,000 square feet of floor area and so located that a person does not have to travel more than 75 feet to reach an extinguisher.

Sprinkler systems

Automatic sprinklers are devices that automatically distribute water upon a fire in sufficient quantity either to extinguish it entirely, or to prevent its spread in the event that the initial fire is out of range of, or is of a type that cannot be extinguished by water discharged from sprinklers. The water is fed to the sprinklers through a system of piping, ordinarily suspended from the ceiling, with the sprinklers placed at intervals along the pipes. The orifice of the sprinkler head is normally closed by a disc or a cap held in place by levers and a soldered link or by other temperature-sensitive releasing elements. The most important thing to remember about automatic sprinklers is that there is probably not a cheaper or more efficient fire-extinguishing system that can be installed in any type of shop building. Since their early use, the performance and reliability of automatic sprinklers has been continually improved as a result of experience and the efforts of manufacturers and testing laboratories. However, the most important consideration prior to installing a sprinkler system is to determine if the pressure and volume of water is adequate for the number of sprinklers that would normally operate in case of a fire. A sprinkler system becomes of no value if for any reason the water supply is not in service, or if the valve is closed or inadequate to supply the sprinklers.

The effectiveness of automatic sprinklers is unquestioned. Only in rare instances do the automatic sprinkler systems fail to control fires. The failures are very seldom due to sprinklers themselves, but rather to the lack of wa-

ter. Such failures do not in any way detract from the value of the sprinkler protection properly installed and maintained. Even in the older types of sprinkler heads, which are no longer approved, the failure of the sprinkler itself is very infrequent. Failure of the modern types under normal conditions is practically unknown. Records indicate that nearly 75% of all fires in a sprinklered building are controlled by one or two sprinklers. And 90% of the fires are controlled by 10 or less sprinkler heads.

Sprinkler systems have increased in cost considerably in the last five years. The cost of a sprinkler system is approximately 85¢ to $1.00 per square foot of floor area of the building. It was interesting to note that in the survey sent to the Railroad Section of the National Fire Protection Association that the Southern Pacific Railroad installed a full automatic sprinkler system in a shop that was over 100 years old.

There are two types of sprinkler systems that are compatible for railroad use, the first type is the wet-pipe system which must be installed in a heated building since the water is in the pipe and ready for discharge as soon as the sprinkler head operates. The second is called the dry-pipe system, which may be installed in an unheated building. The system is operated by means of what is called a dry-pipe valve. The dry-pipe valve has a differential air-water clapper where one pound of air pressure will hold back six pounds of water pressure. When a dry system operates, the air will discharge through the open sprinkler head, and when the air/water differential is equalized, the dry-pipe valve opens filling the system full of water.

Water supplies for sprinkler systems may be provided by several ways: Direct connections to city water systems, or by private water systems. If the city water system is adequate to supply a sprinkler system, a direct connection from the sprinkler system to the city water main will be the cheapest way to provide the water for the system. If the city water is inadequate or no city water is available, it may be necessary to provide a gravity tank or a suction tank and a fire pump discharging from the suction tank to the sprinkler system. The size and type of water system is dependent mainly on the size and type of the sprinkler system provided for the building.

Fixed fire protection systems

There are a number of types of fire extinguishing systems which are useful for railroad use. I will now discuss these types of systems and indicate their probable use.

Carbon dioxide systems

Carbon dioxide systems have their primary field of usefulness in protecting flammable liquid hazards. They are particularly effective where they can be brought into play in a very short space of time, before any large masses of metal can be heated, as hot metal may reignite flammable vapors after the carbon dioxide has dissipated. One application can be the total flooding of a room or space containing flammable liquid hazards. Total flooding of any occupied space requires a time delay and some warning to give time for evacuation. As carbon dioxide is a toxic gas and will not support life in concentrations of 10% of gas to air. It takes approximately 40% gas to air to complete extinguishment. While there are no theoretical limits to the size and space that can be protected with carbon dioxide, the quantities of gas becomes so great with very large spaces that this method of protection is not economical. For example, protection of a 150,000 gallon oil tank of

flammable liquid, if required, can more economically be handled using foam.

Carbon-dioxide systems are referred to as high-pressure or low-pressure systems depending on the method employed to store the carbon dioxide. The design of the system is influenced by the method of storage. High pressure systems are designed to store liquid carbon dioxide at atmospheric temperature in storage containers conforming to DOT specifications.

Low-pressure system storage containers are pressure vessels with a designed working pressure of at least 325 psi. They maintain at temperatures of approximately 0 degrees F. by means of insulation and mechanical refrigeration. At this temperature the pressure is approximately 300 psi. A compressor controlled by a pressure switch, in the tank, circulates the refrigerate through coils near the top of the tank. Condensation of carbon dioxide vapor by the coils controls tank pressure.

Carbon-dioxide systems are usually fixed-pipe systems which are normally empty and are used to convey the carbon dioxide from the storage container to open nozzles at the fire. Systems are actuated by several means such as smoke, heat, flame, or rate-of-rise detectors. A means should also be provided to discharge the system manually in case of a failure of the detection system. This drawing is a high-pressure-type carbon dioxide system which employs automatic fire door releases, automatic window closers and automatic damper closers, to contain the carbon dioxide gas in the protected area.

Halon 1301 extinguishing systems (mono bromotrifluoromethane)

Halon 1301 extinguishing systems are designed and piped similar to the carbon-dioxide systems. However, Halon is a much more efficient extinguishant. It requires only 4½ to 6% gas to air to complete extinguishment. Halon is a relatively new commodity on the market which has decided advantages over carbon dioxide. The main advantage is safety to personnel, equipment costs, decreased sub-cooling of components, less space/weight for agent storage, less pressure build-up in enclosed spaces, and better control of agent loss through uncloseable openings.

Halon extinguishes open burning with low concentrations of agent, generally less than 5% by volume. The agent is considered to be non-injurious to occupants in concentrations below 7%. An area can be flooded to extinguish open burning with relatively little hazard in the room when the discharge takes place. Although evacuation of personnel before a discharge is recommended, the flame extinguishment characteristic of Halon with low concentration, provides for a significant decrease in potential hazard to personnel especially in the case of false actuation.

The cost differential in agent itself lends a significant advantage to carbon dioxide when future refill and service is considered. Halon refills are in the $5.00 to $7.00 per pound range depending on the quantity and refilling location while high-pressure carbon dioxide is provided in the 10¢ or 12¢ per pound range. The lower cost of Halon equipment offsets all or at least a major part of this agent price differential of the initial installation since it takes less Halon to extinguish a fire than carbon dioxide.

Although Halon is an excellent extinguishing agent for flammable liquids, it is increasingly popular for the protection of computer rooms. The computer rooms of the Union Pacific Railroad and the Chicago and North Western Transportation Company have just been equipped with Halon systems, which are activated by ionization smoke detectors.

Dry-chemical systems

Use of a dry-chemical system is limited, and detailed installation standards are very rigid for the fixed piping. There are two basic types of dry-chemical systems: One is the gas cartridge or cylinder with a container of expellant gas, which when released by an automatic or manual means, pressurizes a container of dry chemical. The dry chemical is carried through the piping by the expellant gas. The second is stored pressure where a container of dry chemical is constantly under nitrogen pressure. The dry-chemical systems are used primarily for extinguishing fires in flammable liquids. They are suitable for fires in hot oils and asphalt since they will not cause serious boil overs.

Dry-chemical systems are used extensively in restaurants for protection of the range hoods and deep fat fryers in the kitchens. They also could be used for solvent wash tanks in diesel shops, where a flammable solvent is used for washing parts. Actuation of these systems are usually rate-of-rise heat detectors with a manual back up in case of malfunction of the heat detection system.

Foam systems

Foam-extinguishing systems have been widely used for many years for extinguishment of flammable liquid fires. The field of application has been used mainly for fire control in diesel fuel storage tanks.

Foam is a fluid aggregate of small gas or air filled bubbles that will float on flammable liquids and flow over solid surfaces. It can be made to have a varying degree of persistence, adherence, flowability and permeability. These properties are often tailored to specific system application. Foam extinguishes the fire primarily by forming a continuous blanket over the burning material, thus smothering the fire by excluding the air. Because foam contains water dispersed in very thin films, it also has cooling properties. In protecting diesel fuel tanks, the foam agent is mixed with water at a fixed pump house or station and piped directly to the top of a fuel tank by a fixed piping system. The illustration shows a double-powder chemical-foam system for outdoor storage tanks. These types of systems are usually manually operated systems. However, automatic actuation can be provided.

Alarm systems

Alarm systems can be as simple or as complex as you want them. However, as discussed earlier in this report, an alarm system has never extinguished a fire in its history. All it will do is sound an alarm at a certain designated place; and if no one is there to receive the alarm, the value of the alarm system is worthless.

Alarm initiating devices

The common alarm-initiating devices are heat, flame, smoke and manually operated.

There are two principle types of heat-actuated devices that are used as fire detectors: (1) The fixed-temperature type, designed to operate when the temperature reaches a pre-determined level and (2) the rate-of-rise type, designed to operate when the rapidity of temperature rise exceeds the pre-determined rate, usually 15 to 20 degrees F. per minute, regardless of temperature level. Some devices combine these two characteristics so that a fixed-temperature device operates in case the temperature rises too slowly to operate the rate-of-rise device.

Rate-of-rise devices get a quicker alarm than fixed-temperature devices, particularly in high combustible occupancies, in unheated buildings in win-

ter, and in cold storage rooms. Fixed temperature devices may be more reliable in detecting a slowly developing fire, and do not require so much attention to prevent false alarms.

Flame-actuated detectors are high-speed devices which sense a portion of the infrared energy of flame. It may also be a type which may sense the ultraviolet rays of a flame. It responds very quickly to produce a voltage sufficient to release an extinguishing agent and sound an alarm.

Smoke-actuated devices are especially applicable to ducts of air-conditioning and ventilating systems, electronic computer-room installations, CTC centers, and vital record storage areas. Smoke-actuated detectors operate on a photo-electric principle or involve radioactive ionization.

The photo-electric principle is based upon the change in photo-electric current which accompanies a change in light intensity on a photo-electric cell. The current change results in relay operation which causes a distinctive smoke alarm signal at the supervisory station.

A radioactive ionization type of system consists of individual smoke detecting units that are normally ceiling mounted and electrically connected to indicating control panels. Each detector contains a radioactive material that ionizes the air in a special chamber within the detector. Smoke particles entering the exposed chamber upset the normal ionization and result in an alarm condition.

Manual fire-alarm boxes should be provided in buildings to override the system at any time a smoke or heat detector fails.

It is not the intent of this report to try to delineate specific detailed procedures of the different types of fire-protection systems that have been proven and that are in use today. It is the techniques that are available that have been presented in general terms, only to express enough to indicate what is available to the railroad industry. Since money spent on fire prevention does not give a return on investment unless there is a loss, it is sometimes difficult to sell management to install fire protection. Even though some types of fire protection are very expensive, the fire protection installation is only a very small part of the cost of the building or equipment it is protecting. It is interesting to note that many of the fire protection features I have described will give you insurance premium reduction consideration by your insurance carriers. In some cases, the insurance premium reduction will pay for the cost of the fire protection over a short period of time.

President Ridgeway: Thank you Mr. Payne and Mr. Halley and all the members who contributed to make that fine report.

Our next presentation will be made by Mr. J. R. Williams, engineer of bridges, Rock Island. He would like to show slides with its commentary on "SI Metric for Civil Engineers."

(Mr. Williams presented the slides)

President Ridgeway: Thank you, Jack. This concludes the first afternoon session. We will convene at 9:30 a.m., Tuesday morning in the Regency Rooms A and B.

MORNING SESSION

September 16, 1975

The Tuesday Morning Session, September 16, 1975, was called to order at 9:30 o'clock, President Johnson presiding.

President Johnson: Gentlemen, please take your seats and we will call our Joint Session to order.

As information, our total registration as of this morning is 611. That's total. I don't have it broken down. That's B & B and Roadmasters.

Our first order of business this morning will be the introduction of the Officers, and the Directors of the two Associations. Mr. Ridgeway, will you start, please.

President Ridgeway: Thank you, President Johnson. The Executive Committee of the American Railway Bridge & Building Association, at least all those who have no other duties, and some of them have other duties and could not be here this morning, are: I will start at my extreme left and ask the member to remain standing until all have been introduced, and please hold your applause until all have been introduced:

On the extreme end, Mr. E. E. Runde, construction engineer of structures, I. C. G., Chicago. Mr. Runde is our immediate Past President and a member of the Executive Committee.

Mr. Jim Payne, division engineer, Frisco, Memphis.

Mr. M. Noyszewski, and I see Stan did not make it. I'm sorry.

F. B. Lindsay, Jr., general bridge supervisor, Southern Railroad, Greensboro, North Carolina.

Mr. R. C. McMaster, engineer of facilities and structures, B & L E Railroad, Greenville, Pennsylvania.

Mr. O. C. Denz. Omar is supervisor of bridge maintenance, Milwaukee Road here in Chicago.

Mr. W. E. Brakensiek, assistant chief engineer, MoPac in St. Louis.

Mr. J. W. Davidson, assistant director of bridge engineering with the BN, St. Paul.

These gentlemen are all Directors.

Mr. W. H. (Heine) Huffman, vice president, chief engineer, retired, Chicago & North Western, Chicago.

Mr. W. H. Rankin, senior structural engineer, Frisco, Springfield, Mo. Warren is our 2nd Vice President.

And J. R. Williams, engineer of bridges, Rock Island, Chicago. Jack is our 1st Vice President.

You may now honor these men. (Applause)

The other gentlemen on my side of the table you will meet later.

I will turn the meeting back to President Johnson.

President Johnson: Thank you, John.

I will now introduce our Directors and Officers of the Roadmasters Association.

On my far right, Mr. Ferryman is out at the registration desk.

Mr. D. J. Gale, general roadmaster, Union Pacific, Salt Lake City.

Mr. M. S. McClendon, general roadmaster, Frisco, Tulsa, Oklahoma.

Mr. R. E. Frame, district engineer, Southern Pacific, San Francisco.

Dr. W. W. Hay, professor of railway, civil engineering, University of Illinois, Urbana.

Mr. B. D. Sorrels, division engineer, Santa Fe, Amarillo, Texas.

Mr. A. C. Parker, chief engineer of maintenance, L & N Railroad, Louisville, Kentucky.

Mr. R. J. Massey, assistant to chief

engineer, E J & E Railroad, Joliet, Illinois.

Mr. R. K. Pullem, I want to get this title right, as Mr. Brent corrected me yesterday. Mr. Pullem is division manager of engineering, Chessie System, Akron, Ohio.

Mr. F. H. McGuigan, construction engineer, Missouri Pacific, St. Louis, Missouri.

Mr. T. M. Freeman, track supervisor, Southern Railroad, Chocowinity, North Carolina.

Our Treasurer, Mr. H. D. Hahn, director of public works and engineering, Chicago & North Western, Chicago.

Our 1st Vice President, Mr. R. E. Dennis, regional supervisor of maintenance, Canadian National, Winnipeg, Canada.

Our 2nd Vice President, Mr. Cruse, is busy on the tour today with the ladies, so we'll have to excuse him. This is Ladies' Day.

Gentlemen, now we'll accept your applause. (Applause)

I will turn the mike to President Ridgeway.

Introduction of Spalding Toon

President Ridgeway: Thank you, Bill. I find myself in a rather peculiar situation. I'm sure you all realize what an honor it is to be able to sit beside my boss—the president of my Railroad, and to introduce him to you. However, I note, I don't know how to spell his name. There is no "u" in "Spalding"—it is "Spalding." I'm debating whether I should take my chair and move it over beside Bill Johnson.

But it is indeed an honor, and I apologize Mr. Toon for the slipup. Everything that's been printed has been printed the same way and I'm sorry. It is indeed an honor to be assigned the pleasant task of opening today's Joint Session. As I said, particularly when that assignment involves introducing the President of my own company.

Our speaker was born in Troy, New York. He is a 1940 graduate of MIT, Massachusetts Institute of Technology. However, his degree probably is unique among railroad presidents. It is in Marine Transportation.

His career in transportation actually commenced a couple of years before graduation, when he shipped out on a freighter as the lowest man in the engine room on a voyage to India.

His first relationship with the railroad industry came in 1954 when he served for a year as Assistant to the President of the Bessemer & Lake Erie Railroad.

Prior to and following this initial railroading assignment, he was employed in various capacities in the field of transportation. In 1964 he was elected a Director of the Bessemer & Lake Erie and several associated railroads. And in 1969 he became President of the Carbon County Railroad in Utah.

On July 1, 1972, Mr. Toon was elected President of the Bessemer and two other Class 1 railroads, eight smaller switching and terminal railroads, and a dock company. Mr. Toon. (Applause)

Winds of Change

By M. SPALDING TOON

President, Bessemer & Lake Erie, Pittsburgh, Pa.

Thank you very much, John, for that splendid introduction. If I didn't know you better and if you had only spelled my name correctly, I would have suspected you of apple polishing.

I was particularly pleased to be asked to be the keynote speaker for this second day of your three-day joint session, although I'm now given to believe that such invitation is more or less "automatic." I understand that presidents of railroads whose representatives head your respective organizations are asked each year to fulfill the two keynote assignments, so really all that I'm doing today is basking in John Ridgeway's reflected glory.

Seriously, my clleagues and I are proud of John's work over the years with the American Railway Bridge and Building Association.

Although the Bessemer and Lake Erie is one of the smaller Class I roads, our policy has always been to encourage active participation by our people in various industry associations . . . not only to learn from the experience of others, but also to contribute worthwhile input based upon our railroad's not insignificant activities. We are doubly pleased, therefore, when one of our capable managers is willing to devote the time and energy necessary to advance "through the chairs" to become president of an association such as this.

Now someone once said that: "THE ONLY CONSTANT IN RAILROADING IS CHANGE," and I think history truly lends this support. Of one thing you can be certain—and that is

M. Spalding Toon

that railroads are in a constant state of flux.

We in the industry know this; but, unfortunately, the general public does not. The man on the street sees little difference between today's railroads and those that started serving our nation almost 150 years ago . . . and it is true that the basic concept remains unchanged. Locomotives still move cars over rails . . . but when you've said that, you've said it all. Practically everything about railroading, beyond the concept itself, has undergone drastic change and improvement.

Historically, the list of changes in our industry is long and impressive. Wooden rails with iron strapping gave way to iron rails, then—later—steel rails of constantly increasing weight and strength. Over 100 local time zones were standardized by the rail-

roads into today's four, which were officially adopted by Congress for the nation's use.

Over a score of rail gauges, as wide as six feet and as narrow as two feet, were standardized at today's 4 feet 8½ inches. Railroads were early users of the telegraph and telephone, hastening the nation's acceptance of these electronic improvements. Air brakes, dieselization, mechanized track equipment, computerization, centralized traffic control, train radio, automated yards, specialized freight car equipment, piggyback, unit trains . . . the list goes on and on.

But enough for history. It is more important that we consider the winds of change that are blowing today . . . and for the railroad industry—gentlemen—there are many.

Of primary importance, of course, is the proposed restructuring of bankrupt railroads in the Northeast.

As you well know, the United States Railway Association completed its Final System Plan on July 26, and it is now before the Congress for consideration. Inasmuch as this is the "only game in town" short of outright nationalization, which hardly anyone wants, it appears we will see ConRail commence operations sometime in March of 1976. With the Penn Central alone losing $242 million in the first half of this year, it is essential that prompt action be taken to preserve vital rail service in the East. But the changes brought about by this restructuring will, ultimately, affect the entire railroad industry . . . not merely the roads operating within the 17-state Northeast region.

Government enters railroad industry

While ConRail is designed to keep the region's railroads in the private sector of the economy, the overall aim being to eventually have it become a profit-making operation, it will—for the first time since the World War I takeover—bring the government directly and solidly into the railroad business. The plan calls for the federal government to invest at least 1.85 billion dollars to acquire and rehabilitate the bankrupt lines that will be consolidated into ConRail.

The planners predict that ConRail will begin earning a profit in 1979. Further, that it will eventually repay the government's investment, and finally, somewhere down the line, that it will return completely to private ownership. If ConRail fails in this respect and many consider it to be a most optimistic projection—there appears to be but two alternatives: Either full nationalization of the railroad industry, as is already the case in most of the nations of the world; or a continued heavy government financial involvement. Either course puts the federal government in the railroad business to stay.

Even if ConRail succeeds in exactly the manner envisioned by its planners, it will represent a major change and a whole new ball game for the railroad industry. "Profitable" railroads that are not included in ConRail will be competing against a new 15,000 mile quasi-governmental rail system that will be completely rehabilitated and rejuvenated with massive infusions of government money. While U.S.R.A.'s planners have recommended certain actions to strengthen and improve some of the region's profitable roads, there is no assurance such roads will be able to adequately meet the strong competition of the huge federally-supported system.

As a matter of fact, the Final System Plan predicts that by 1979 diversion of traffic from the solvents to the long-haul ConRail routes will be at the level of 30 million dollars per year.

The eastern bankruptcies, in the

opinion of many, are merely the tip of the ice berg. Pointing to the Rock Island, such observers feel that the same factors leading to the bankruptcy of the Penn Central and other roads in the Northeast, will ultimately spread to railroads in other sections of the nation. One of our Chicago-based railroad presidents, in a recent interview, said that in his opinion there is serious question whether any railroad—under existing public policy—can be viable over the long term.

The fundamental problem of the railroad industry today, of course, is inadequate earnings, and most railroad experts attribute this principally to the uneven treatment of the various modes under our present National Transportation Policy.

In recent testimony before a Congressional committee, Steve Ailes, President of the Association of American Railroads, called for immediate change. Claiming that present federal policy "dooms the U. S. railway system either to economic extinction or to massive future dependence upon the public dole," he pointed out that in 1974, when railroad earnings were the best in eight years, they still produced a paltry return of 3.45 percent. This is far short of being adequate, especially — gentlemen — when you consider last year's interest rate of about 9 percent to borrow money for new equipment and other capital improvements.

Now if anyone needs proof that this industry is in trouble—in real serious trouble—he need merely refer to financial results for the year to date. For the first time in history, our industry—as a whole—had a deficit in net railway income in the first quarter, and an industry-wide deficit of over 115 million dollars for the first half of the year.

Many railroads are in the red

Thirty of the 64 reporting Class I railroads operated in the red during the first six months of 1975. Sixteen of these roads were in the East, three in the South and 11 in the West. The immediate cause—of course—is the serious recession affecting the nation's economy. But, the **underlying** cause goes back to a National Transportation Policy—or perhaps, more properly, the **lack** of a National Transportation Policy—that adversely affects railroads by an estimated 2.5 billion dollars annually. Among the burdens placed on railroads by the government are such things as the cost of rate regulation, losses from unprofitable branch line and passenger operations, property taxes paid on rights-of-way, and grade crossing costs. There is no need to detail these items—they are familiar to all of you—but together they have an estimated impact on the railroads of about one billion dollars a year.

A further impact estimated at 1.5 billion dollars annually results from inadequate user charges being paid by our competitors for the use of highways and waterways constructed with tax monies.

But despite the seriousness of these problems, I hope you will not look upon me this morning as only a prophet of gloom, for I feel that there are forces at work that give us hope for a better future. In a statement submitted with the Final System Plan, Arthur Lewis, chairman of U.S.R.A., noted that there is a changing public attitude toward regulatory policies, energy and the environment that portends a fundamental turning point in the historical relationship between the nation and its railroads.

I agree with Arthur Lewis that the railroad crisis seems to have finally awakened the public, and their elected representatives, to the essential nature of railroads and the necessity of some positive action being taken to assure their viability.

Regretfully it required a crisis to bring about this change. Certainly, the nation had plenty of warning, long before the bankruptcies, that its railroads were in trouble. But perhaps crisis decision-making is not all bad. Actions taken in response to an obvious crisis are likely to be more heavily and quickly endorsed, both because of the urgency that a solution be found and also because the process is carried on in the full glare of the public spotlight.

New legislation is proposed

Indicative of this important change in public attitude is the fact that two bills have been introduced in the current Congress that hold promise as a "first step" toward solving some of the industry's problems. The Railroad Improvement Act of 1975, H.R. 6351, was introduced by Congressman Brock Adams, while the Railroad Revitalization Act, H.R. 7681—commonly referred to as the DOT Bill—was introduced by Congressman Harley Staggers at the request of the Ford Administration.

Both measures call for regulatory reform and for financial assistance to premit improvement of the railroads' plant, service, and ability to compete. Although similar in scope, these two bills differ in a number of areas, and are currently the subject of hearings before a Subcommittee of the House Committee on Interstate and Foreign Commerce.

While the railroad industry has not endorsed either bill *en toto* and is recommending several important amendments, it is most encouraging to note that both bills provide 2 billion dollars in loan guarantees, some desirable regulatory reform, termination of discriminatory state of taxation of right-of-way, and more effective abandonment machinery for uneconomic branch lines.

I would have been happier if these measures had also included such items as more favorable federal tax policies, additional financial help in upgrading and maintaining grade crossings, and outright grants as well as loans . . . but the fact that this remedial legislation is receiving serious Congressional consideration, I believe, bodes well for the future.

A third bill, S. 2265, The Rail Services Act of 1975, was introduced just last month by Senator Vance Hartke. It calls for the creation of a 10-billion-dollar trust fund to finance rehabilitation of the nation's railroads. The fund would be supported by federal taxes on diesel fuel used by railroads, trucks, and barge lines over a 20-year period.

There are also several bills in Congress calling for federal aid to provide railroad public service jobs. Under this proposed legislation, railroads would receive grants to cover costs involved in rehabilitating trackage.

Also worthy of mention is the nation's energy crisis. While it is hard to find a silver lining in this very dark cloud, in my opinion it is only a matter of time until traffic volumes start to reflect the fact that railroads can move freight with one-third the fuel, with one-third the air pollution, on one-tenth of the land, and with one-sixth of the accidents, as compared to our principal competitors.

As "Change" is the subject of my talk, it should be pointed out that some of the matters I have covered will mean change for those of you involved in the engineering end of the railroad business. The Final System Plan embodies a right-of-way and capital expenditure and rehabilitation program of about 4.2 billion dollars by ConRail alone during the next ten years, and this includes 1.4 billion dollars of deferred track structure replacement.

Expect increased capital outlays

For the railroad industry as a whole, capital outlays for replacement and ex-

pansion project averaged slightly over 2 billion dollars annually during the five-year period, 1970 through 1974. But now the Transportation Association of America, following an extensive study, estimates that capital requirements for the upcoming five-year period, 1975 through 1979, will average 3.8 billion rollars annually based on 1973 constant dollars and giving no weight to inflation.

Gentlemen—with figures like these, it is obvious there is much to be done, not only in the replacement of obsolete plant and facilities just to maintain present service levels but also for the expansion needed to handle increased traffic. But experience has shown that under present public policies it is impossible for the railroad industry to generate or borrow the necessary funds.

If Congress, as a result of its current deliberations, enacts legislation encompassing guaranteed railroad loans, or a combination of grants and loans, you can be sure that a good part of the money will be used for work that is Engineering Department responsibility. Similarly, if the railroads should gain an appreciable amount of new business because of their energy efficiency, or because of an up-dated National Transportation Policy, it seems certain there will be an escalation of B&B and track work on most roads.

Railroad managements are fully aware of the many problems faced today by their maintenance-of-way officers and supervisors. They appreciate your efforts to maintain quality in the face of inflated costs for labor and material, and they recognize the added administrative burdens that have been placed upon you by such federal and state governmental regulations as track safety standards, bridge inspections, E P A, and all the rest.

Whether or not ConRail in the end succeeds, it seems almost certain that there will be a substantial increase in expenditures for maintenance-of-way projects during the next few years, with a corresponding enlargement of the duties and responsibilities of the members of your two associations. Deferred maintenance alone on many of your railroads dictates such an increase if this industry is to survive in the private enterprise sector.

As in the past, we in top management will be entrusting much of its hopefully increased resources to your expertise. So it will be largely your responsibility to make sure that there is a most judicious application of these funds. It is no longer sufficient to determine that a bridge in a remote location needs painting. It is now necessary to determine, for example—whether only those portions of the bridge that are subject to accelerated deterioration should be painted—so that perhaps two structures can be protected with the same total funds. While it may still be necessary, for aesthetic reasons, to do a full paint job on mainline bridges subject to public scrutiny, you must question whether it is really necessary to give the same cosmetic treatment to bridges that are hidden from public view on remote branch lines. It is imperative that you get the most for your dollar, and the fastest.

An equal challenge exists in the area of track maintenance. It is my observation that you have come a long way in improving efficiency by mechanizing main line maintenance. It is also my impression that you have a good handle on mechanized work. Expensive equipment is involved and you make certain, I am sure, that you know exactly what to expect in terms of units produced per man-hour worked on track. You have made the mechanized operations so efficient that they now represent only a minor part of your labor cost.

Reduce cost of other work

Perhaps you will agree that the time has now come to move in on the non-mechanized portion of your operations —general repair work in yards, lubricating switches, welding and grinding switch points and frogs, and all the rest. A better means must be found to set goals and standards, and to measure performance.

The potential is great if you can get the same handle on non-mechanized work performed at the discretion of your local foremen that you obviously have on your mechanized operations. These examples illustrate what I mean when I say you must get the most for your dollar, and the fastest. I am convinced that you can do it!

The proposed rehabilitation of railroads in the Northeast will bring still another challenge to those in your respective fields. You are going to find yourselves competing with ConRail with respect to the availability of rail, ties and other track components, as well as track machinery of all kinds.

For example, at a recent Congressional hearing, an I.C.C. representative testified that 24,000 track miles need upgrading throughout the industry. The present plant capacity of suppliers, however, is only 4,800 track miles of rail per year, which means that it would require five years of full rail plant production just to upgrade the track presently requiring attention. It is apparent that long-range planning will become increasingly important, as the railroads vie with each other for their fair shares of the available material and equipment.

Well—to summarize—while it is true that our industry is in a crisis situation —perhaps the most serious in its long history—winds of change promise hope for the future. A possible solution to the Northeast problem, a change in the public attitude toward regulatory policies, Congressional consideration of legislation that will help equalize competition between the various modes, and the energy-environmental advantages inherent in rail transportation, all point to the possibility that we are about to "turn the corner."

A new threshold

If, in fact, the railroad industry is on the threshold of revitalization, you men and the forces you supervise will play an increasingly important role.

I think we can all agree with Oliver Wendell Holmes, who said: "I find the great thing in this world is not so much where we stand, as in what direction we are moving."

And—gentlemen—in your very important functions, you share a great responsibility that this industry now moves in the right direction.

I am sure that at the conclusion of these productive meetings you will return to your properties in better position to assist in that effort.

Thank you for your kind attention.

Mr. Ridgeway: Mr. Toon, we are indeed indebted to you and thank you very much for sharing your valuable time with us, and for your excellent presentation.

We will be honored to have you stay for the rest of the morning meeting, but we also understand, if you must leave, as your schedule demands, please feel free to do so.

Introduction of Asaph H. Hall

President Johnson: Thank you, John.

Our next speaker for the morning, as you know, the United States Federal Railroad Administration is charged with two important functions. First, the safety of the American railroad system. Second, helping the rail industry identify and perform its proper role in a balanced national transportation network.

Our guest today guides the direction of the Federal Railroad Administration in these two areas. Since 1969, he has served in various executive capacities at the Department of Transportation, working principally on solving the nation's complex rail problems.

Prior to federal service, he handled management positions at Westinghouse Electric Corporation for twelve years.

A native of New York State, he holds Bachelor and Master's degrees from Dartmouth College, where he graduated summa cum laude.

Ladies and gentlemen. Federal Railroad Administrator, Mr. Asaph H. Hall. Mr. Hall.

Railroad Needs and Federal Responsibility

By ASAPH H. HALL

Administrator, Federal Railroad Administration, Washington, D.C.

Thank you very much, President Johnson, Mr. Toon, and other distinguished representatives at the head table, and gentlemen:

I was going to say "ladies and gentlemen" but the only lady present is the one I brought with me from Washington, so I will say "Lady and gentlemen."

As a way of opening this morning, I would like to say that when the invitation was received from your organizations last spring to speak at this joint meeting, I accepted very gladly at that time I felt very sincerely that in the area of track and structures and the general area of maintenance of way, that this more than perhaps any of the activities in the railroad industry would be receiving the most emphasis over the coming months and perhaps years and that whomever was in the position of administrator would be very happy to speak before you this fall. I would remind you at that point

Asaph H. Hall

I was in an acting capacity and had not yet been nominated for the job, so I

was accepting a little bit out of faith perhaps.

I might say I am very pleased to be here personally and not have someone else addressing you in my place.

I think I would also say I share very much the substance of Mr. Toon's remarks this morning about the changes that I believe will be taking place in the railroad industry over the next few years. I think there is no question that we are moving more and more into a situation of joint industry-government involvement. You might say whether you like it or not, it's going to be there. But in the sense, I think, of mutual objective of trying to rehabilitate the nation's railroad system and make the railroad industry a much more efficient and profitable industry in the private sector during the next decade or so. It is quite fitting, I think, that I should be addressing you this morning on the general subjects of rail safety and also the rail legislative programs, looking towards the next ten years or so and what will happen as a result of what Congress may do this year.

It's my job, really, to walk that fine line between being the regulator and enforcer, if you will, of rail safety in the industry on the one hand, and on the other hand an increasing role of attempting to be an advocate for the rail industry, not only within the executive branch, but also in the halls of Congress, to attempt to point out what the problems are and what types of solutions might be feasible over the near term.

That sometimes is a very interesting line to walk, I assure you, but we'll do our best and hopefully with your assistance in both of these areas we will see a great improvement over the current situation over the next ten years.

First, I would like to talk generally about the rail safety area and then move to the legislative area after that.

Train accidents are increasing

In the area of rail safety, there is no question that train accidents of all types, but particularly derailments, have been increasing at an alarming rate over the past few years. Last year, train accidents totaled nearly 11,000, 10,694 to be exact, which was a 10.3% increase over 1973. Admittedly, the rate of increase was lower last year than it was the previous year, which at that time was almost 29% above the 1972 level. But that certainly doesn't make it an acceptable rate.

The preliminary figures for the first six months of 1975 don't look quite as grim as the last two years. Our preliminary figures show a 2.7% increase in train accidents for the first six months of this year over a comparable period of 1974. And that's comparing both periods under the new reporting threshold of $1,750 per accident, which went into effect only this January. And again a comparable first half, 1975, increase in derailments is about .9% above last year.

However, in my view, although the curve perhaps is flattering in the rate of increase, I would very much like to see that curve start on a downward trend, and I'm sure you would.

We have determined from our own in-house analyses that the FRA minimum track safety standards cover about 98% of the reported causes of all track accidents. This doesn't necessarily mean to me that those track standards are perfect. I'm sure all of us would be the first to admit they are not. In my view, we should be conducting periodic reviews of track safety standards in addition to our other safety standards perhaps over a two to three-year cycle, jointly with the industry and with our own track people try to determine what changes should be made on a rather regular basis.

I think we all have a lot to learn

about track standards and what are good ones and what really don't do the job and such programs as I will discuss a little later in our area I hope will help us all learn a little more about that particular subject.

Last year track defects of total train accidents caused 41% of all accidents. These figures indicate to me there is a need, particularly this year and next year, for better compliance and better inspection procedures by the railroads themselves—and I emphasize by the railroads themselves.

FRA was not set up to be simply a police force. We have no desire to be cast in that role entirely. The poor financial condition of the industry, as Mr. Toon most eloquently talked about earlier, I believe is really the root of the problem, and deferred maintenance, as you know, is widespread. We have studies which would indicate somewhere in the neighborhood of 5 to 7½ billion dollars deferred track maintenance throughout the country. Whether that number is exactly right or not, I don't think makes that much difference. It is a real large number.

Track work is reduced

It is probably brought home to us this year in the downturn of the economy and lower traffic levels where some railroads—not all—but some railroads have drastically reduced their track maintenance programs.

Our safety standards in the track area, as you know, are minimum standards. We're not asking for 100-mile an hour track coast to coast, and continuous welded rail on all branch lines. Class I track isn't very efficient perhaps, but at least it meets minimum safety requirements at 10-mile an hour speeds.

I would like to discuss with you some of our recently initiated measures to help stem the increasingly number of track accidents throughout the country. But, first, I would like to suggest that maybe we should talk more to one another.

What are the problems that you encounter in meeting the standards and what can we do to help you? As maintenance of way and track officers and supervisors, you certainly have a better feel for the difficulties than anyone else in the area. And since you live with them on a daily basis, we urge you to feel free to submit your own suggestions, recommendations and discuss with us how you see the problem and how our standards or how the industry's own standards could be improved in this area.

Our own actions involve both working more closely with certain railroads who have high accident rates and proposing in some cases increased enforcement powers for our own and state inspectors.

A recent safety improvement plan was initiated with a thorough analysis of accident statistics in relation to geographic locations, railroad properties and general cause categories, how federal standards covered these various categories of accidents, and the rate of train accidents per million of train miles and per billion gross ton miles by individual carrier. The action being taken, based largely upon these analyses, is directed towards improving the carrier's own safety inspection programs as well as the enforcement capabilities and efficiency of the federal and state inspection personnel.

These measures include regular inspection and surveillance efforts to ensure that all carriers are reporting accidents properly and are operating in compliance with federal safety regulations.

But our major enforcement effort is focusing on the top ten railroads identified in the 1974 accident statistics as exceeding an accident rate of 25 acci-

dents per million train miles. The location of the accidents, the cause, the reason for failure, and three categories —track, equipment, or human factors —is determined, and our inspectors then work with the railroad to identify and implement remedial action.

Study good records, too

In conjunction with this, our inspectors will investigate operating conditions and procedures of a few selected railroads with low accident rates for purposes of comparison of train operations and conditions of track and equipment with those carriers with high rates.

We will also be utilizing more extensively our track inspection car in conjunction with a new high rail-type vehicle which is capable of measuring and recording track surface irregularities. In addition, we are outfitting a second track-inspection car which will be available for full time use by our Office of Safety next year.

Our existing car is already being used extensively, principally on Amtrak routes in the Northeast and the Midwest, and, in fact, some of you have probably already seen that car on your own property.

On the rule-making front, we recently issued a Notice of Proposed Rulemaking that would give the federal and state safety inspection force a stronger hand in ensuring safety in equipment and in track. In the track area, a railroad could be required to reduce operating speeds over a specified segment of track upon written notification from a track inspector. This would be, of course, in lieu of the current enforcement activity we have, which is simply to write a ticket and eventually fine the railroad for violations. The rules would also define procedures for the use of emergency orders, which could shut down track completely that is unsafe even at minimum speeds. We held public hearings on this notice in July and as of today our Chief Counsel's office is now reviewing the comments and we would, of course, be moving forward, having analyzed those comments.

As an added measure, I have asked our new Deputy Administrator, Bruce Flohr, to make safety a special responsibility in his new duties. Bruce came on board just last week from the Southern Pacific, where his most recent job was as division superintendent on the San Antonio Division, which is the largest S. P. division. We're delighted to have him with us and I know he is very much looking forward to meeting and working with you in the future. He certainly will be of great help to me as, in a sense, a non-railroader, as someone I can turn to and rely upon to presumably present what it's really like out there in the real world. I think, and I'm hoping, that between the two of us we'll make a fairly effective team in trying to address from the Washington viewpoint, at least, the various problems of the railroad industry.

You may be feeling at this point that I have been contradicting myself about the FRA not wanting to be a policeman. I really don't think so. It's not, certainly, our objective. I think the additional precautions that I have mentioned will help us all do our jobs more effectively. And I can assure you we will be applying them with judgment and with reason. Our mandate in the Department is to serve as the advocate of a safe and efficient railroad industry, not its jailer.

Discusses research projects

The other side of the safety coin is the research and development area. I would like to give you just a very brief rundown on some of the track related programs in which we are currently involved.

One project involves track stability. This is being done at Princeton University and includes an analysis of tortional buckling of track containing rails that are experiencing unequal compression.

The second project involves track simulation modeling with the objective of developing a family of integrated track sub-system models capable of predicting force levels and stress distribition throughout the total track system matrix. Work on this program is being carried out jointly with the Association of American Railroads.

Other projects include improvement of rail flaw-detection capability, rail material failure properties, and behavior characteristics, a rail flaw occurrence study, engineering analysis of stresses in rails, sleeve expansion of bolt holes in rail, characterization of wheel/rail loads, and analysis and design requirements for improved crosstie track. Also, as I mentioned earlier, that track/train dynamics program, which is basically a system analysis of the interaction between the track and the rolling stock.

New test track at Pueblo

Then probably one of the most urgently needed programs is a facility that will permit the railroads and their suppliers to learn more about the cause and effect of rolling stock and track deterioration by permitting the accumulation of typical life cycle experiences on an accelerated basis. A limited addition to existing trackage is being made at our Transportation Test Center in Pueblo, Colorado, to provide for such an interim capability. With the government's propensity for acronyms, we're calling this FAST, which stands for the Facility for Accelerated Service Testing, and we hope that it will be very useful for both safety and performance life cycle testing for a variety of items, including rolling stock, track, and other railroad components.

I personally would hope we can go beyond simply an interim facility. And, assuming that some money is made available to us this next fiscal year, we could proceed to build a permanent loop at Pueblo, which should then be available for the industry as a whole to conduct these accelerated life cycle tests.

I won't trot out all of our laundry list of R & D projects, but I think this sampling probably gives you a fairly good feel for how deeply we are involved in the subject of track related research and development. I would also add that we have as one of our principal objectives, or goals, in this area to work very closely with the industry. I think perhaps one of the problems in the past in FRA—R & D program has been 2-fold: one, it has been too far out. It has tended perhaps to emphasize the Buck Rogers approach. We're trying to pull that back in and look at the near term problems which are of direct relationship to the freight rail industry as it is today. And, secondly, that we have tended perhaps to go off on our own a little too much or, restated, have not communicated enough with the people in the industry who are directly related with the problem. And our new R & D Director, Bob Parsons, whom I hope many of you will get to meet, has as his chief objective to make sure we are coordinating through the AAR and with the individual carriers these research and development programs.

Funds authorized for research

Congress itself has shown a great interest in this area. It authorized for the past fiscal year, in '75, $10 million for safety related research and development activities under amendments to the 1970 Federal Railroad Safety Act.

And we hope that in the '76 appropriation, which we haven't yet gotten, that number will also be appropriated to us.

This research effort can, both in the short and long term, assist greatly in improving the safety picture. The best example, I think, is in terms of money. The industry has estimated that in 1973 the cost of derailments alone caused by failed rails and inadequate track geometry was over $30 million. The target of the safety research program we have undertaken is to reduce the frequency of these accidents by 75%.

Discusses rail legislation

Now I would like to move just quickly to the subject of rail legislation. Mr. Toon in his remarks covered perhaps many of the key areas that I think you should be aware of. But I might address a couple of additional highlights and flush out somewhat on the legislative picture as we see it these days in Washington.

First, I would like to address the Regional Rail Reorganization Act activities, the USRA ConRail program, which, as you are well aware, has kept us very much hopping for the last two years. And I believe that the plans that have been laid out by USRA in the Northeast are in a sense crucial to the entire rail industry, because without a massive program of rehabilitation and restructuring in that area, I truly believe that would be the part of the country that would tend to drag the rest of the nation down towards nationalization. I might say that even as of today we are very much involved in various areas of rehabilitation in the Northeast and Midwest region under the provisions of the RRR Act, as we call it. This is even before ConRail starts up next spring.

Under one of the provisions of the Act, known as Section 215, there is a loan program jointly administered by FRA and by USRA, which will put in by next March about $160 million into track related program maintenance, upgrading and rehabilitation of the bankrupt railroads in the Northeast region, principally Penn-Central, Lehigh Valley, Reading, C & J, and the Erie. This program is now in full swing and I think any of you who go out and ride around those properties will see a great increase in activity in terms of track work during the summer months and continuing on through the construction season.

I sometimes think we ought to put a sign up, like they do on the Interstate Highway System, and say, "Your Tax Money At Work," so that people would know that we are now beginning to assist the railroad industry, as well as some of the other modes.

As you know, USRA has submitted its Final System Plan, as Mr. Toon mentioned, and ConRail, hopefully, assuming everything goes right this fall, will be up and running about March 1, 1976.

On behalf of the Ford Administration, Secretary Coleman testified last week before the House Commerce Committee and expressed our firm support for the USRA Final Systems Plan. And I would quote just one of his statements in that testimony. He said:

"It is thorough, detailed, imaginative, and deserving of the wholehearted support and approval of Congress. Under a very demanding time schedule, USRA has prepared a plan which I feel offers the best opportunity currently available for the creation of a viable, self-sustaining, private railway system in the region. As an indication of our support, we concur in USRA's proposed bill to amend the Regional Rail Reorganization Act to make the changes in the act necessary to implement the Final System Plan."

And those changes basically involv-

ed additional financial support well above and beyond what was in the original act. As Mr. Toon mentioned, the projection of USRA for financial assistance is $1.85 billion. We are, in fact, proposing that Congress authorize and appropriate $2.1 billion to USRA for ConRail's use. The additional $250 million is what you might call a margin of safety in case the projections are not exactly on the nose. And we are supporting that fully and we trust that Congress would take affirmative action on that funding.

I believe you are aware of the general nature of the rest of the plan, which would set up basically a 3-system east in the region where Chessie takes over large portions of the Erie and the Reading Railroads, and ConRail assumes most of the other bankrupt properties, and the N & W acts as the third competitive major carrier in the region.

We believe that this structure meets the general goals of the act to provide both a financially viable system in the east over the long term and also a system that at least keeps a certain minimum level of competition operative.

Forsees other changes

Assuming that Congress goes along with this, we would also foresee perhaps additional changes in the future in the Northeast. Another provision in our proposed amendments to the act would authorize $400 million to the Secretary of Transportation, which could be used for future, what are called supplemental transactions, which might involve additional sales to solvent carriers in the region from ConRail over some period of time, strictly on a voluntary basis, or in fact, vice versa, so that there could be perhaps a continuing restructuring of the basic rail system in the Northeast.

It is my own conviction that no plan is really final. You learn as you go along, and I think that probably applies as well to the "final system plan." And our attempt here is to provide a mechanism and a certain funding incentive which could be used to allow that process to continue over the next several years.

As was mentioned earlier, the funding, as a part of the final system plan, does embody a large rehabilitation program, particularly in the track and catch-up maintenance categories, 4.2 billion total for ConRail, of which 1.4 billion is in deferred track structure replacement. And targeted for the first priority rehabilitation would be those road and yard tracks in heaviest use and in need of repairs to insure high-level and continuous service.

The first and second priority lines under this program are the lines handling more than 20 million gross ton miles per year, and secondly between 5 and 20 gross ton miles per year. That will cover about 93% of the proposed ton miles moving over the ConRail system.

If we have a few minutes and you would like to go into that, after my remarks, I will be glad to answer any questions on that particular program.

Congress reacts to passenger service

Another part of our northeast activity under the same Regional Railway Organization Act involves the Northeast Corridor. Although I recognize that most of you have probably forgotten about passenger trains, those of us who live in Washington are constantly worried about that because Congress seems to react perhaps more to passenger service than anything else.

I think it is fair to say that one of the areas we all can agree on generally as requiring some improvement is the line from Washington to Boston, where we see a major opportunity for high-speed rail passenger service in that

densely populated corridor. And under the RRR act the Department was required to carry out engineering studies and planning necessary to achieve various goals for improved high-speed passenger service in the corridor. It also requires that we implement what are called immediate improvement programs in the corridor to correct for known major problems that are now affecting service.

In our planning for improvement for this activity, we have analyzed many changes of the last year in the system capabilities which would be designed to achieve the ridership potential in the corridor. These include development of new high-speed track structure and rolling stock, modernization of electrification, improved access through refurbished or new stations, elimination of grade crossing completely, fencing of the right-of-way, and many other related improvements, including such things as the use of concrete ties for perhaps the whole length of the corridor. We are looking towards speeds eventually of perhaps up to 150 miles an hour on major tangent track in the corridor.

In coordination with that, we have implemented what we are calling an emergency improvement program to eliminate slow orders on the corridor and the Penn-Central main line, and this is begun jointly with Penn-Central and with Amtrak, and it is funded through a $25 million appropriation to us in the Department along with a $15 million contribution by Amtrak. All of this work is currently under way between Washington and Boston and will be completed by the spring of 1977.

Now, just to conclude: A few words on the national system and how that relates to the legislative activities on the Hill.

Believes Congress will act

As I said earlier, and as Mr. Toon said, the poor financial condition of the industry has led to massive deferral of maintenance that has been in our view the major cause for the upsurge of accidents. We are also addressing this problem and in May sent our proposed railroad revitalization act to Congress, which we hope will be a first step towards dealing with the entire national railroad situation. Comparable bills are also being developed in both the House and the Senate, and my own view is that it definitely appears this year that Congress is finally moving towards the passage of fairly comprehensive rail legislation, hopefully by the end of this session in December.

Both the Senate and the House Commerce Committee staff have been working hard during the summer months, and we along with them, to try to develop areas of agreement which could be involved in a so-called omnibus rail bill, which would pick up what is required to be done in the northeast, as well as the rest of the country. And I think we have reached a fair amount of agreement in the regulatory reform area. We're looking at pricing flexibility, some abandonment provisions, looking at railroad rate bureaus, and various other areas, and I think we are reaching now a general consensus on proving those areas of what we think are oppressive regulatory burdens on the railroad industry.

We are now addressing at full length the financial issue. There is a hearing this Thursday before the Senate and next Monday before the House on that specific issue of what federal financial assistance should be provided to the nation's railroad system as a whole.

More financial assistance

Our bill provides for a $2 billion loan guarantee program. There are now bills in both the House and the Senate which add up to something like 10 billion for the various elements of

the program and contain a mix of grants, loans, loan guarantees, and what have you, in various proportions. We have not as yet really met and agreed, the Executive Branch and the Legislative Branch, on the specific provisions. However, I think it's fair to say that there is an agreement that some financial assistance is obviously needed during this period of the next five years or so to pay for the catch-up maintenance that is obviously required on the system, to provide the rail industry with the front-end capital that is required during this, hopefully, transition type period where, as regulatory reform takes effect, the industry as a whole will be able to come out of what is a very low rate of return and begin to generate the internal cash to fund its own maintenance and operating programs.

I will not devote any further time this morning to a discussion of our bill. I think that you are probably quite familiar with its provisions. We are hopeful that we will be able to jointly with the Congress agree on a bill in the next two months and to me it is very definitely a first step down the road towards a complete revitalization of the rail industry. There are obviously areas that are not covered in this legislation which do have to be addressed in the context of a total national transportation policy.

Unequal treatment

One of those is the unequal treatment of the railroads in terms of the subsidies that are provided to the other modes. We recognize this. I believe Congress recognizes it. But I think you will understand in the political processes that we deal with, how difficult a problem that is to sort out. It's the Administration's position that the subsidies that are being provided to other modes should be lowered. In other words, the user should be paying the full cost for federal financial assistance. I'm talking now to the freight system more than I am to the passenger, which doesn't seem to lend itself to that kind of policy.

As far as freight movement is concerned, we are proposing that the water carriers be levied with charges which presumably then would pay for the federal assistance in that area, and we are restudying the area of the highway user charge to determine whether in fact there is a cross subsidy being given to the large trucking industry. There seems to be an indication that there is.

So, I think you will see the Administration moving very aggressively to try to correct that inequity. At the same time, we will be attempting to arrive at a financial assistance package which makes sense for the rail industry, recognizing that it is not completely analogous to the other modes in the sense that you do own your own right-of-way, you are very definitely a private sector industry, without some of the public benefits that accrue from the highway system, and so forth.

So it is not a simple thing to sort out, but I assure you we are working at it. Mr. Coleman will be producing a new version of the National Transportation Policy Statement—in fact, tomorrow, I believe it's supposed to be published. I would urge you to read that, take a look at it, and we will be trying to work within that general framework.

Always remember, it is a two-group arrangement. The executive branch can propose but it is Congress that disposes. So I would urge you all, as you watch what happens and become informed on the plans that are being developed in the legislative area, to make sure that you are making your views known where it really counts, and that is in the Congress. And I would hope you would urge the Congress to con-

cern themselves this fall with the legislation that is before them and hopefully come forward with a bill by the end of the year.

In conclusion, let me stress a point that I consider to be of utmost importance. It is the responsibility of the industry—the responsibility of all of you gathered here this morning—to play a major role in the further development of all of these plans and proposals. The federal government has a responsibility for helping the railroads in every possible way consistent with the public interest. But the ultimate revitalization of the railroads will largely depend on you. We can't make them safer or more efficient or more economical to run without your expertise and participation. These issues are vital to the nation and to you and I urge you to join in as they are discussed and as plans are developed and implemented.

I will be happy to answer any questions, if you would like to take the time. If not, I have certainly enjoyed my appearance before you. I hope we will be seeing a lot of each other over the coming months, and I thank you very much. (Applause)

President Johnson: Gentlemen, Mr. Hall has agreed to answer any questions from the floor. If any of you gentlemen have any questions, please rise, and Mr. Hall will answer them.

Protests Lock & Dam 26 project

Mr. Massoth: We're fighting very hard out here in the midwest against Lock & Dam 26. We have great difficulty with the clout that the Corps has. Does FRA have any good recommendations how we can fight that clout?

Mr. Hall: I'm very familiar with that. The Department was asked by Senator Magnuson, who is the Chairman of the Senate Commerce Committee, to conduct a 120-day study of Lock & Dam 26, viewing it from the context of the total transportation system rather than on a mode by mode basis. That study has been conducted jointly within the Department by our own office of the Secretary Policy staff with the assistance of the Federal Railroad Administration and the Coast Guard, a very interesting triumverate, I might say.

The draft report was reviewed last week by Secretary Coleman. It basically, although it is not completely finished because he bounced it back for some rewriting, I think you will find that it basically comes out saying that we as a Department recognize that the construction of an increased capacity lock along the lines of what the Corps of Engineers has proposed, would have a very adverse effect on several midwestern railroads. It, forthermore, has a very long-term effect on the whole transportation system, if you will, in the region, both in the water side and the rail side, and that the proposal by the Corps of Engineers and the data that they use to support the cost benefit analysis really is of such—I'm not sure how to phrase this—but is not good enough to support the proposal. That is basically how we came out.

What this means is that additional analysis will be required, we think, before any such project could go ahead and, furthermore, I believe that this perhaps for the first time in an official government manner, will surface the very adverse effect on the rail industry, and allow people to start thinking about it in a very much broader context.

I wouldn't want to go much beyond that at this point because we actually don't come out with a recommendation saying that you shouldn't build it, or should build it, but the Secretary is basically saying there is not enough supporting data to build it and you should be doing more.

I think this is what the Department

of Transportation was in effect meant to do when it was set up and maybe this is one of the good examples of the ability to finally get together and look at a transportation project which has very long-term implications from a total perspective. I can assure you we have been trying to represent the rail industry from the FRA side.

Final ConRail plan

W. J. Jones (S.P.): Ace, you indicated that DOT and FRA are supporting the ConRail plan. What does Congress have to do with it? I think there is some confusion about what steps they have to take to implement the plan and what are their alternatives? What if they do not implement the plans? Could you comment on that?

Mr. Hall: Yes. The question was, what happens next as far as the Congressional approval of the final systems plan and what do they technically have to do and what are the implications if they don't act?

No. 1, according to the act, the only thing they have to do is not act and the plan will go into effect 60 legislative days after it was submitted. By the calendar, that is November 9th. However, it's not that simple. The final system plan includes many provisions which are definitely required in order to implement the final systems plan as it has been laid out.

One of those is financing above and beyond what is in the act. Another is a deficiency judgment indemnification for the Chessie System to purchase the Erie and Reading properties. Chessie has made it very clear they will not enter into that kind of sale unless they are assured they will not later be called before the courts and told that the purchase price was not fair and equitable and therefore they owe X million dollars more. They are asking for federal government indemnification against that deficiency judgment.

There are other areas that are involved in rather technical changes to the act in order to make the final system plan operative.

Congress must act

What this really means then is that Congress must act affirmatively, must pass ,in effect, amendments to the act which will allow the final systems plan to be implemented. It's possible that Congress could not act this fall. Technically, the final system plan is approved, but you can't implement it. We think that will not happen. If it were to happen, I think there would have to be a very quick recycling early in the session next January with either modifications of the final systems plan or Congress finally acting positively on these various elements that are involved.

It's our feeling at the moment, I think it is fair to say, that Congress is moving down the roal towards some positive action. Whether it will be exactly as USRA and ourselves have proposed, who knows? But we do think it is the only game in town. Although there are criticisms on the final system plan, I think the Congress will probably say, "We can't produce another one so therefore let's take this with perhaps some minor modifications which can be worked in."

So I can't answer your question, Jack, precisely on what would happen if they don't act. I think it's our hope, at least at the moment, that this will all move forward in a logical sequence. The contingency plan would be to send everything back to U.S.R.A. for another cycle. My view, I'm not sure that the bankrupt railroads in the Northeast can wait that long. Having looked at it from our standpoint of administering these temporary grant and loan programs to the bankrupt railroads, it simply is going to be a huge additional drain on the federal treasury to keep

it going over any extended period of time and we want to see ConRail up and running for that reason.

Effect on other railroads

Member: Much has been said about the rehabilitation requirement of the railroads in general and even more about the railroads in the east and an awful lot about the rehabilitation requirements of ConRail. Now ConRail's rehabilitation requirements have been outlined by Mr. Coleman, which is quite a substantial figure. Now if ConRail comes into existence and if the funding is available to undertake this rehabilitation, it's going to place the other railroads in an extremely delicate situation as far as competing with ConRail for the available material.

Now, I have two questions. One, has FRA analyzed the rehabilitation requirements, as to their reasonableness?

Secondly, has any thought been given to some sort of allocation program for materials and equipment by FRA?

Mr. Hall: In answer to the first question, to be very candid, I would say our review has been a general review. We simply do not have the technical capability within FRA to conduct in a sense another entire analysis of what USRA has come up with. I think it is our feeling that the analysis that has been done by USRA is pretty good. They presumably brought in a lot of talent to get it done and they cycled it, I think, about three times so that in general I think you can say it's a good job. Obviously, as ConRail gets into it, I would almost bet it changes because I think the management of ConRail, as they begin to implement the plan, will obviously find areas that are subject to change. But I think in gross terms we would definitely say we would agree generally with what they have come up with.

In terms of the allocation question on materials, I may be wrong but I think the tightest area is probably in the rail area. At least at the moment it appears that ties are plentiful, although I suppose that can change over a period of time, but there is a severe capacity limitation on the production of welded rail. We have had discussions with the various welded rail steel companies, who have come forward with various ways that they can increase their production. They also are coming forward with ways they could get federal money to help them, and we have not greeted that with too much optimism.

On the other hand, I think there are probably short term, two years, let's say, ways in which the rolling mills could increase, let's say, about 20% their capacity. Beyond that, it probably takes an entirely new plant, which is a substantial investment.

Want long-term stable demand

I don't think at the moment we have addressed seriously an allocation question. We are addressing, however, the broader question of how can we provide a more long-term stable demand for those types of products which would then provide incentive for the private sector to invest with the assurance of a market, say, over a long period of time.

I think the Federal Financial Assistance program we're talking about for the rail industry as a whole, plus the Northeast, should provide some kind of marketing projection for these companies to, in fact, increase capacity and hopefully keep away from the problem of allocating material. We would like to avoid that, if possible. I guess if it comes down to a real crunch here in the next couple of years, we would certainly have to address allocations and certainly from our perspective we would have to look on it as a national problem and not just a ConRail problem.

Member: I wanted to ask a question, how long will it be before you have a program that defines the incentives for rail management to continue to rebuild their property. By that I mean, when will the FRA show incentives that will keep private management in the business? When is your program supposed to be complete on that?

Mr. Hall: Much of it is very directly tied to new legislation. At the moment, we have very limited authority in terms of programs either from a financial size or from, let's say, a "restructuring" planning responsibility. I believe that if Congress does eventually pass a major financial package this year, which is coupled to some extent with the ability on railroad management's part to run their business more flexibly, that is, the regulatory reform activities that I have mentioned, that we will then have incentives in the private sector to rid the system of what might be considered uneconomic investments and apply available capital funds to those areas of the system which, in your judgment, are the best places to put the money.

That is both from the marketing standpoint in terms of how should the traffic flow over the system perhaps on a consolidated basis, more consolidation of traffic flow on high density main lines, and also in the consolidation of yards and terminals, and so forth. So there is not as much of a fragmented investment going on, that the federal money would go into those areas from a national standpoint that appear to have the most payoff in terms of the total rail network.

Won't foster duplicate facilities

Now I would be the first to say, I think in my own opinion, that the federal government should not be the one that comes in and says, "You'll put your money into this line and that line." The initiative should come from the industry. However, you have to recognize once the federal government gets into something it has to make certain findings based on criteria and I believe in general our criteria would be that we would not want to put money into duplicate facilities.

We would say, "There are three main lines, or four, or five, in parellel here and we're not going to fund five different applications to fix up those five main lines. We may fund two or three. But you have to come in with a proposal that makes sense for which ones are the best ones to keep in top condition and which ones should be down-graded and we will then make money available to rehabilitate those lines.

I think that's coming. How it comes is still a little bit up in the air, depending upon what Congress decides. They are toying with giving some of that responsibility to USRA on a nationwide basis. For instance, we would prefer, I think it is fair to say, to let the USRA, having done its job in the northeast, not become another bureaucracy and keep it more centralized than the Department of Transportation, but that remains to be seen.

Thank you very much. (Applause)

President Johnson: Thank you, Mr. Hall. We appreciate your coming. We would be happy to have you stay with us during our session. I'm sure you're busy and have a busy schedule, so please feel free to leave at any time.

I'll turn it back to President Ridgeway.

Introduction of M. L. Mannion

President Ridgeway: Thank you, Bill.

Yesterday morning at the Joint Session, Harry Campbell had announced that the South had taken over. Of course, we had Mr. Tom Rice from the Seaboard Coast Line, Mr. Bill Johnson, also from the south. Harry himself is from Montgomery. Today, I would like

to say the Bessemer has taken over. This is not an insiduous plan by any means, but at our March meeting at our Executive Committee of the B & B, Merwin Dick threw out the fact that with all the increased activity in coal production and coal transportation, it might be nice to have a program on coal. We looked around and our next speaker, we felt, was the most qualified person on bulk material handling there is in the country right now.

Mr. Mannion, who is going to be our next speaker, was born in Greenville. Greenville happens to have all the operating offices of the Bessemer. They are in Greenville.

Mike feels quite at home at this meeting because Mike started his work career on the Bessemer as a track laborer in 1939. In two years time, he learned all there was about track, so he moved over to the Bridge & Building Department. The Bridge & Building Department is not quite as complex because he spent only a year there. From there he went into the Signal Department.

Then he joined Union Switch & Signal. He spent a year with them.

Then Uncle Sam caught up with him and he spent '44, '45, '46 in the Army. He came back from the Army and he went to work for the Clinchfield Railroad, in the Signal and Communications Department.

In 1956, Mike moved over to the B & O. And he was in Research and Development with the B & O.

His wanderlust being over, he came back to Greenville and the Bessemer in 1960 as the head of our Signal Communications Department.

In 1962, Mike was promoted to chief industrial engineer, his present position on the Bessemer Railroad.

Before I present Mike, I would suggest you at the head tables get seats on the main floor because Mike's program is illustrated and slides will be projected at your back, Mr. Mannion.

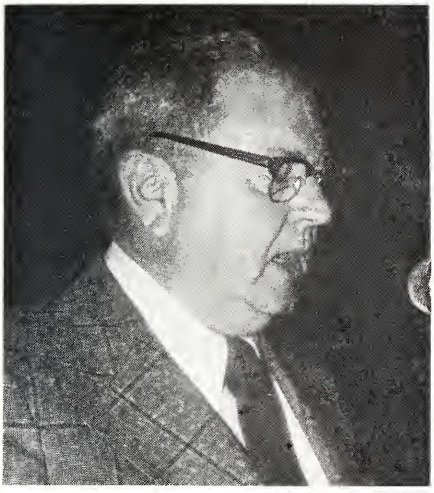
Terminal Facility for Rail to Water Transportation of Bulk Materials

By M. L. MANNION

Chief Industrial Engineer, B.&L.E., Greenville, Pa.

They say a picture is worth 1,000 words, so you are going to see about 47,000 words.

I have some slides that I put together that kind of portray what we have done in the transportation area on the Bessemer & Lake Erie, and while the subject is "Rail to Water Transfer," it's also "Water to Rail Transfer." I think after listening to the two speeches this morning the subject really ought to be "Job Security." And I have mixed emotions about job security this morning because one of my first jobs when I went into industrial engineering on the Bessemer & Lake Erie was to deter-



M. L. Mannion

mine whether or not we should any longer have a Bessemer & Lake Erie Railroad.

That may sound funny, but if you gentlemen will stop thinking about what your particular job really is on the railroad and think about whether or not you could build the railroad that you work for and handle the business that you're handling, and you got the right numbers put together, you would find out you couldn't afford practically any railroad in this country today. And that's the bad sign of job security.

The only good thing about job security that I have heard this morning is that they now have a government agency, FRA, and that has "railroad" in it, and every time they have started an agency down there, it's kept going. So maybe the railroads are going to stay around. They have got to have a railroad if they are going to have an agency, so it will be there.

These fellows have been talking about billions of dollars. And naturally in a complex system and as large as the railroad industry is, it takes billions of dollars and you handle billions of tons. But, really, I think if we get back down to some little things, the people who are here, of course, are the guys who do things. You're the fall guys in a lot of respects—but you're the guys who come to the fall meetings. And as Mike Rougas says, "The spring meeting is kind of where they do the technical stuff, but the fall meeting is where you meet the guys who really make it go." You do the work in the field.

Get the whole picture

The engineering departments on the railroads have more education than any department on the railroads. You have more technical education. But I think now you have to take your brain power and put it into some other activity. Start to help the guys who are thinking transportation or system planners, and so forth, and think of the total system concept. Don't just think about whether you are going to paint part of a bridge that is exposed to the public, don't just think about how you get the track land, but think about how can you get the industry to be a viable industry again and get them going up and down the tracks. You maintain the tracks, you maintain the bridges, and there isn't any problem with that. The problem is, people are trying to figure out ways to put heavier cars on those tracks because they think they can save some dollars by having bigger cars and less cars and that sort of thing. I want to see everybody concentrate their efforts for a little while towards getting more cars. I don't care if they are big cars or little cars, but let's get a whole lot of cars and let's make them go up and down the track.

Let's get into a lot of fights with the track department about the fact they don't have time on the track because, I think we'll be in a pretty healthy situation if we do.

Handle bulk loads

The Bessemer & Lake Erie Railroad —I think you ought to know something about it. It operates between the Great Lakes and the Pittsburgh mills and basically we don't have all of the different commodities that some of you people have, but we do have a concentrated volume of about four commodities. We handle ore, stone, and coal, being the three major commodities. We handle a lot of coke, which is another form of coal, but we operate over a 140-mile sector, and we have now finally found out how to make the railroad work very well. We now have business running in two directions.

Now, if you will dim the lights, I'll show you how we got there, show you some of the problems we had getting there, tell you what we planned to do, and then I'll show you some pictures of what we really did. I'll start with the first slide.

(Slides) Conneaut, Ohio, is the northern terminus of the railroad and it's a port facility on the Great Lakes.

The Bessemer & Lake Erie operates between Conneaut, Ohio, and North Bessemer, basically, with connections with Penn-Central and Erie-Lacakawanna, serving mills in the Youngstown area. The southern part of the railroad has the activity from the standpoint of production, both in the making of steel and also in the producing of coal.

Traces path of ore

This map shows the origin of the ore and stone that comes to the Bessemer via the Great Lakes, starting with the ore from the Duluth and Mesabi iron range, from their docks at Duluth and and the Two Harbors, that material is transported to Chicago and also to the port at Conneaut basically, and also from Labrador, from Quebec, down through the St. Lawrence river, through the Seaway, Lake Ontario, through the Welland Canal, and through Lake Erie. In the other direction, there's a lot of coal in southwest Pennsylvania and West Virginia, and the northbound movement basically is coal.

The operation of coal and ore docks on the Great Lakes had remained basically unchanged for many years. Vessels arrive randomly, dependent on a number of variables—weather, dock delays, en route delays, etc. As a result, most ports are congested during certain periods by vessel queuing, while at other times the ports are open.

Historically, docks have been operated as a direct vessel-to-freight car or freight car-to-vessel interface, with loaded cars being accumulated over a period of days for outbound cargos and empty cars being accumulated for inbound cargos. Additionally, the Lake season represents an abbreviated year, interrupted to cargo movement for three-four months by the winter freeze.

During the early 1960's the Bessemer and Lake Erie Railroad recognized the bright future of coal as the most abundant energy fuel for making electric power.

The markets using coal that could be served by the Bessemer were the electric utility industry and other consumers in Canada and the upper Lake region in the United States. Involved in the route of coal shipments via the Bessemer, however, was a boat movement from the Port of Conneaut, Ohio. This transportation movement was limited to about eight months each year because of ice conditions on the Great Lakes.

With the limited shipping season for Lake coals, something dramatic was necessary if the Bessemer was to participate in the developing coal market. Thus, the idea was conceived to design a new bulk terminal for rail-to-

lake coal shipments which could accept coal on a year-round basis, stockpiling in the winter months.

Advantages of terminal

Major advantages could accrue to all participants if such a terminal was available.

The shipper could produce coal twelve months a year, eliminating production curtailment in the winter season.

The railroad could move coal throughout the year, increasing equipment utilization and reducing the peaking requirements of the Lake season. With the ability to stockpile, car days —absorbed in cars under load waiting for boats—could be saved.

Boat-loading rates could be increased with multiple loading input, from car and storage reducing boat time in port and increasing tonnages available for lake movements.

The consignee would have an insurance stockpile at the port to protect against industry shutdowns and could participate in savings accruing to the transportation companies involved.

With these major advantages in mind, the concept of winter storage of coal and summer storage of ore and stone was considered.

Eliminating the severe, negative impact on railroad equipment utilization alone was sufficient justification to construct the winter coal storage facility at Conneaut.

Prior to completion of the original facility, market forecasts indicated increased participation from our customers, and all design and construction was based on the major premise that expansion would continue as long as service performance remained satisfactory.

The original facility built in 1964 has been expanded to a point where the coal storage capability is presently 3.5 million tons. With the initiation of coal stockpiling, the interface between freight car and vessel was eliminated. Coal is now delivered to Conneaut during the entire 12-month year. No longer are loaded cars accumulated for days and even weeks in assembling lake cargoes, and coal is now dumped upon arrival at Conneaut.

The storage concept has had a tremendously favorable effect on hopper utilization. Car detention which was as high as 12 days per load in the early 1960's, is currently less than two days per load.

In-port time of coal boats has improved dramatically. With the multiple-feed systems now available to vessel loaders, loading rates on the larger vessels have exceeded 7,000 tpy and generally range 5,000 to 6,000 tph.

Our participation in lake cargo coal had diminished to less than 500,000 tons. We now handle 8-plus million tons and are prepared to expand as the need arises.

This system offers many important benefits:

(1) Mine production does continue for the full year;

(2) Trains and boats are operated independently of each other. This eliminates demurrage charges and scheduling problems;

(3) Modern stocking, reclaiming and vessel loading machines permitted low-cost handling and storage charges;

(4) Faster boat turnaround occurred because coal was always available when the vessel arrived.

Features of new facility

For those of you who have not seen our modern coal dock, I brought along several views of significant features of the system.

Bottom-dump hoppers are pulled through the unloading pit by locomotives controlled remotely from this tower.

Coal is moved to the various piles over a system of belts, and then over one of two traveling stacking machines. We can unload cars and stockpile at the rate of 3,600-4,800 tons per hour.

Coal can be reclaimed from piles for boat loading by several means—a McDowell Wellman wheel as shown here; a Barber Greene reclaim wheel; a pit fed from live storage by dozers; and a portable conveyor.

Two storage silos and a surge hopper are located between the reclaim belts and the shiploaders. They have a combined capacity of nearly 13,000 tons.

Two shiploaders, one fixed and one slewing, enable us to attain a loading rate of 11,000 tons per hour.

Was the system successful? The proof of the pudding—a tenfold increase in coal business at Conneaut. In addition, our competitors constructed two similar coal storage ports at Ashtabula and Sandusky after the benefits of this concept were proven.

In view of the success of the Conneaut Coal Facility, the handling of ore through Conneaut was examined to develop the economics of a similar facility for stockpiling inbound ore during the Lake season and reclaiming over the entire year for movements to the mills.

The unloading, handling, and movement of inbound ore at Conneaut had been even more of a costly, operational problem than the processing of outbound coal.

Twelve-month customer requirements of iron ore were received during the 8-9 month lake season. Within this period, the ore dock was frequently heavily congested with vessel ques and just as frequently completely clear. The effects of "boat bunching" are far-reaching. As many as 700 empty hoppers are required within a 24-hour period, and this type demand can continue for several consecutive days. With the current car service rules which prohibit the reloading of foreign cars, the railroad servicing the dock has an extremely difficult time supplying the quantity of cars required. Excessive demands such as the above require the railroad to accumulate and store empty hoppers so they are able to comply when required.

In addition to the demand for empty hoppers at the dock, the loading of large quantities of commodities for customers necessitates the backlogging of loads on the railroad, since our customers lack capacity to dump the quantities which are arriving by boats in surge periods.

As a result, the equipment utilization of the railroad suffers severely due to the stockpiling of hundreds of empties ahead of the dock, and the holding of as many as 2,500 loads of ore which customers are unable to accept or unload. Conditions such as these produce a general paralysis on the railroad, with all yards and sidings clogged with static freight cars.

Although the most drastic effects of ore surges are felt by the servicing railroad, certain other adverse effects are experienced by the dock company. High freight car demands produce car shortages, and car shortages seriously impede boat unloading and often produce double handling of material. Reduced unloading rates lengthen vessel turnaround cycles, with the associated increased cost to vessel owners.

Decide to store the ore

All of the above conditions contribute to excessive operating expenses for both the dock company and the servicing railroad. Based on these facts, the construction of an ore storage facility was approved early in 1970 to again completely rupture the vessel-freight car relationship. With the ore storage facility, customer requirements could

be shipped on an "as needed" basis. Benefits from this concept would accrue to:

(1) Dock Company—in operating costs and in the ability to provide service to vessel owners and customers;

(2) Servicing railroad—by vast equipment utilization improvement (which would reduce car and locomotive ownership requirements), and in reduced train operating expenses;

(3) Consignee—who will be able to receive his material by type and quantity as he requires, so he can reduce the stockpiling of materials during the Lake season and the subsequent double handling;

(4) Vessel Oners—elimination of the delays inherent with railroad servicing (vessel-freight car interface) will result in reduced in-port time, on the average, of all vessels.

(Slide) Each of the five Hulett machines which you see has been modified to discharge its 17-ton load through a hopper and feeder, directly onto a belt running parallel to the dock face.

From here, the material moves to a transfer point, and then . . . up an elevated belt to the bluff behind the old storage yard. These belts can handle 10,000 gross tons per hour. From here the material will be delivered to the ground.

If desired, the material need not be placed on the ground, but instead can be routed directly to the car loadout station. This station will also be fed by two bucket-wheel reclaimers, each designed to handle an average of 5,000 long tons per hour.

We have also made provision to handle self-unloading vessels, which can discharge into this hopper at a rate up to 10,000 long tons per hour.

One of the primary objectives of the system is to provide a means of loading trains made up of the various ingredients required in a day's activity at the steel mill—such as pellets, limestone, or ore in proportioned amounts.

Controlled by computer

Cars are moved under the loadout station by radio-controlled locomotives. The loading is programmed by computer so that the precise amount of each desired material is placed into the car. We can load four hundred 100-ton capacity cars every 12 hours.

Our aim was to unload coal each day and reload the cars with ore or stone 12 months a year on a daily basis, to balance the use of trains and cars for maximum utility of plant and equipment.

When designing a transportation and materials handling system, the consumer's existing facilities must be considered. The type of car must also be the best to service his unloading facilities.

Since a large portion of material flowing through Conneaut goes directly to the mills, it will be possible to deliver directly to the furnace trestle, thus saving costs now involved in car dumpers, transfer cars, and ore bridge handling. From figures published by the American Iron and Steel Institute, it appears that a sizeable cost reduction can be accomplished by reducing this handling where it exists.

(Slide) You can see from this chart that material can be delivered to the Valley mills from Conneaut in less than 24 hours after loading has started.

Direct delivery to the mills in self-clearing hoppers is possible with the development of this scheduling.

The Bessemer Railroad has in operation today 1,000 self-clearing hopper cars, and many other railroads are buying and building cars specifically designed to unload through the bottom and effiectively release all the material.

It has become clear that this is the most economical method of unloading where it can be employed.

Big saving of cars

Hopper cars used for loading ore, stone and coal can be better utilized, and car-day costs reduced dramatically. A conservative estimate indicated that 525 cars can be eliminated through improved utilization. Since the replacement cost of this equipment is approximately $30,000 per car, a future investment of almost twenty million dollars is avoided.

Before closing this presentation, let's quickly review the advantages of a balanced system of train and terminal operations:

(1) Less vessel delay due to port facilities engineered for modern self-unloaders;
(2) Fewer cars required in service;
(3) Fewer locomotives required to transport a given volume;
(4) Less trains operated per day;
(5) Eliminates seasonal movement;
(6) Uniform daily railroad movement over the entire year, independent of boat arrivals;
(7) Lower switching costs incurred by the railroads;
(8) Release in-plant storage area, which may be required for expansion;
(9) Reduced demurrage at mills;
(10) Lower materials handling costs at the plants.

Mr. Dove: I didn't see any car heating facilities. Don't you need that for coal?

Mr. Mannion: We definitely have car heating facilities. We find with coal that you definitely have to thaw it. Some of the coal originates from the B & O and is transferred to our railroad via the Butler Gateway and the coal will be in cars for as high as 7 days from distant mines. That definitely has to be thawed. We have a 10-car thaw shed.

I just hope that presentation gave you a few pictures of what we have done. I hope that you got something from the concept and hope that in some fashion we can do some more things of this nature and that you can, too, so you can enjoy the prosperity we are enjoying because of it. Thank you. (Applause)

President Ridgeway: Mike, thank you very much. That lived up to my expectations. I knew it would be a fine presentation. And being familiar with the facility, of course, and having had some small part to play in it, it was a very, very excellent explanation.

At the present time, 11:15, today we have a total of 495 roadmasters registered, we have a total of 157 B & B registered, and we have others, some will register both as B & B and Roadmaster, and guests, 49, for a total registration of 701.

Just one reminder. The Roadmasters will reconvene at 1:30 in this same room. The B & B will resume in the room next to this, where we met yesterday, and at 1:30.

I urge both the Roadmasters and B & B people who want to attend this afternoon's session to be prompt so that the programs can start exactly at 1:30.

These two rooms and the room the B & B will have will be converted into one room and the REMSA Banquet will be held here tonight. So they do have to have time to knock this room down, set up the banquet tables and get ready for this evening. So you should be prompt so we can finish our programs on time.

A reminder—tonight, of course, is the REMSA Dinner. The doors will open at 6:30. Dinner will be served at 7:00 sharp. If you have not gotten your tickets for dinner yet, you may get them outside the door.

Bill do you have anything else?

I can think of nothing at this moment. The meeting is adjourned.

. . . Recessed at 11:45 A.M. . . .

AFTERNOON SESSION

September 16, 1975

President Ridgeway: The meeting will please come to order. The second meeting of our 80th Annual Convention is now in session. The first feature of this afternoon session will be the report of special committee No. 3. This committee is sponsored by F. B. Lindsay, Jr., general bridge supervisor, Southern, Greensboro, N.C. Will Mr. Lindsay please come forward and introduce the chairman?

Mr. Lindsay: The subject of the next report is "Controlling Water Pollution at Mechanical Facilities." The chairman of this committee is W. J. Gunkle, supervisor structures for the Penn Central at Cincinnati, Ohio. Mr. Gunkle.

Controlling Water Pollution At Mechanical Facilities

Committee Report

COMMITTEE—W. J. GUNKLE, *Chairman*, supvr.struct., P.C., Cincinnati, Ohio; A. J. DOLBY, environ.engr., I.C.G., Chicago; H. H. HOPKINS, asst.supvr.b.&b., R.F.&P., Fredericksburg, Md.; W. H. MELGREN, chem.engr., S.L.-S.F., Springfield, Mo.; J. A. OPPERT, Clark, Dietz & Asso., Urbana, Ill.; and E. E. RUNDE, mgr.const., I.C.G., Chicago.

In the past, efforts and accomplishments by railroads toward controlling water pollution have been a mere drop in the bucket. Consequently, new laws that have been put into effect governing pollution control, particularly at mechanical facilities, will impose a great financial burden on all roads.

Railroad industry associated operations that are considered significant generators of wastewater requiring treatment are locomotive servicing and maintenance stations and tank car cleaning operations. Locomotive servicing operations consist mainly of (a) fueling only, (b) fueling, washing and running maintenance and (c) heavy repairs. Fueling only does not normally constitute a problem until heavy rains or snows fall, then the water floats the oil up through the ground to the top, which in turn flows to a waterway resulting in pollution. Engine cleaning facilities generate pollution problems due to detergents and the amount of oil washed from engines and the great quantities of water used. Cutting oils for cleaning parts and higher concentrations of lube oils used at heavy repair facilities cause problems, and car cleaning facilities generate such a wide variety of commodities that produce pollutants. It is estimated that there are over 650 fueling stations for loco-

motives in the U.S. and approximately 550 stations that perform locomotive washing and running maintenance.

Two separation methods used

Primarily, two methods of separating oil and other chemical impurities from waste water have been used—gravity separation and air flotation. Gravity separators are generally used to reclaim fuel oils only where detergents are not used, but it is necessary to use air flotation to separate oil from water where detergents are present.

Gravity separators operate on the difference in specific gravity between oil and water; oil being lighter than water, it floats. To make this principle work efficiently, it is first necessary to slow the rate of flow of water, allowing it to deposit its load of sand, silt and other sedimentary particles. This is accomplished by allowing the waste water to flow into a sedimentation basin, or grit chamber, ahead of the separator. This basin is designed to intercept the accumulation of all undesirable products. It is important that sediment not be allowed to reach the level of the flow line of the outlet pipe permitting its entry into the separator.

From the sedimentation basin, waste water then flows into the separator where its flow is again slowed to allow free oil to rise to the surface. The water outlet is enclosed by a baffle which holds back the floating oil so that water flows under the baffle and over an outlet weir. The oil weir is slightly above the water outlet. An oil blanket builds up in the separator until the surface of the oil is up to the level of the oil weir. Oil then overflows into the oil sump from which it is automatically pumped into a storage tank.

In some gravity separators, oil is skimmed from the top of the separator tank by one of several methods. The three most common are slotted pipe skimmers, belt skimmers and pumps. The slotted pipe is half submerged in the tank with a slot in the top to allow oil to flow in while it is being moved over the surface. Collected oil is then conveyed through the pipe to an outlet and thence to a stroage or collection tank. The belt skimmer hangs into the separator tank and oil adheres to it as it is pulled by motor over scrapers and is scraped into a skimmings hopper and conveyed to a holding tank. In the third method, controlled pumps are used to pump oil off of the surface and into a holding tank.

Air-flotation method is expensive

The air flotation process is somewhat more complex, involving a more elaborate installation, often the use of chemicals, and consequently is a more expensive operation. Because of the high cost, the use of this process is confined to removal of pollutants that will not separate naturally by gravity.

In the air flotation process, waste water is first run through a gravity separator to release solid sediment. Some free oil is released here also. After passing through the gravity separator surge tank, pH adjustment is made and the waste is then pumped into a retention tank. Air is introduced by venturi action into the influence and the mixture is then put under pressure in the retention tank, and chemical treatment, if needed, is added. Chemical treatment consists of addition of charged particles—alums or polymers —to the solution to free emulsified oils from solution. The emulsified oil is drawn to and attaches itself to the particles and either floats to the top or settles to the bottom, depending upon the chemical used.

After the introduction of air and subsequent pressurization, the solution then passes into an open coagulation chamber where pressure is relieved. As this is done, air comes out of the solution as pin-point effervescence, similar

in action to what is seen when a bottle of carbonated beverage is opened. Air flotation systems are based on the fact that gasses are soluble in liquid in direct proportion to the pressure applied. The liquid can be supersaturated with dissolved air under pressure, and when the pressure is released under proper hydraulic conditions, the air comes out of solution in minute or molecular form. These molecules tend to attach themselves to a nucleus which, in waste water treament, is the contaminants. In seconds, a sufficient number of molecules have collected to form "life jackets" around contaminant nuclei and immediately float them to the surface. Released pollutants are then skimmed off in the same manner as in the gravity separator, and clean water effluent is discharged through the effluent riser.

It might be mentioned here that in both processes a constant water level is maintained throughout the system and some water is being recycled at all times. The amount that is recycled is in inverse proportion to the concentartion of impurities.

Still a third treatment

Finally when gravity separators and air flotation - chemical addition processes do not sufficiently clean wastewater, tertiary or third stage treatment is required. This can take one of several forms ranging from absorption to use of carbon filters.

Oil released from these treatment processes is stored for later disposition, either to be used as a weed killer, burned in power plants or sold to oil scavengers. Sediment from grit chambers and separator chambers is released in the form of sludge which is poured onto drying beds where remaining moisture is allowed to evaporate, leaving the dried refuse. This sludge, when dumped, will contain about 75% water, from 2% to 7% oil and the remaining part solid sediment.

The United States Environmental Protection Agency, or E P A, requires that any discharge, regular or infrequent, meet a set of limitations which ideally should prevent any railroad from polluting the waterways of our country in any form. Discharge is defined as being the spilling, leaking, dumping, pouring, emitting, emptying or dumping of waste material. Any point source where there is a discharge of water or pollutants to a water course must be permitted by the E P A, and therefore must meet their guidelines.

Oil, petroleum products and their by-products are defined as being oil of any kind **but not limited to** petroleum, fuel oil, oil sludge, oil refuse, oil mixed with other wastes, crude oil, and other liquid hydro-carbons regardless of specific gravity. Any person, firm or corporation which permits or suffers a discharge of oil or any other harmful chemicals into a water course will be liable to the state or municipality involved for all cost of clean-up or property damage resulting from such discharge.

Public Law 92-500 passed by Congress on October 18, 1972, establishes procedures, methods and equipment and other requirements for such equipment to prevent discharges of oil and hazardous substances from vessels and from on-shore facilities and to contain such discharges. The penalty for this discharge provides that any owner or operator of a vessel or on-shore facility subject to any regulation issued under the above law who fails or refuses to comply with the provisions of any such regulation shall be liable to a civil penalty of not more than $5,000 for each such violation. Each violation shall be a separate offense.

Guideline for railroads

Effluent guidelines for the railroad

industry have been passed by the Congress and, as of this date, have been set up on a regional basis until national standards are adopted. The deadline for complying with present standards is mid-1977, with a goal of zero pollution by 1983.

The basic limitations state that by mid-1977 the average monthly discharge into streams must have no more than 10 ppm of oil and grease. A point source may exceed this by a small amount on a given day, provided that the monthly average is not exceeded. Further, there is to be no more than 30 ppm of suspended solids on the average for a month, and finally the pH of discharged water must be between 6.0 and 9.0 at all times. If you remember your chemistry, pH of 7.0 is nettral; above that is acid and below is alkaline. There are also limitations on concentrations of heavy metals such as zinc, lead, chromium, etc., as well as on temperature of the effluent.

Industry is also required to run periodic analyses on their effluent and keep records of their flow. These must be reported to either the U. S. E. P. A. or to an authorized state E. P. A.

Other recommendations in the guidelines have to do with construction of servicing facilities, control of spillage and of leakage of fuels and oils and disposal of spent cleaning fluids. It is recommended, for example, that outside servicing facilities such as fueling stations and wash racks be constructed with impervious surfaces and drainage collection systems to prevent seepage into surrounding ground areas.

Run-off is significant

Here are a few facts to illustrate the impact that provision of the law can have on the railroads. As previously stated, there are over 650 locomotive fueling stations and about 500 stations that perform locomotive washing and running maintenance in the U.S. Run-off from fueling stations to surrounding lands or storm sewers during rain or snow constitute a significant pollution source.

At washing stations, between 200 and 500 gallons of wash and rinse water are used in cleaning a locomotive, and there are more than 28,000 locomotives in service in this country. Detergents added to wash water result in emulsified oil as well as free oil and suspended solids, and wash waters are usually alkaline and must be neutralized. Add to this separated oil and sludge generated by running maintenance such as lubricating, oil and air filter and cooling system servicing, and the problem is magnified.

Heavy diesel repair facilities are the largest sources of wastewater in the railroad industry. Based on a survey of 45 heavy disel-repair complexes, about half of the point sources, E. P. A. estimates that 1/3 of those surveyed have wastewater flows of less than 50,000 gallons per day, but that most will generate between 50,000 and 350,000 gallons per day from all operations. It is further estimated that from 100,000 to 300,000 gallons of wastewater will be generated per unit overhauled.

Spill control at unloading and storage points is another very important factor in controlling water pollution. Here is what one railroad is doing to control spillage and leakage at a large terminal facility.

What one road is doing

The facility is located in a large metropolitan area in a southeastern state and accommodates all aspects of railroad locomotive and freight-car maintenance and repair including the fueling, lubricating and sanding of locomotives.

The terminal facility incorporates two physically separate drainage systems, both of which discharge into a creek. The first system is a storm water drainage system that drains a park-

ing lot area and discharges directly into the creek.

The second system is a combination storm water and waste water (excluding sanitary waste) drainage system that passes through an oil separator and subsequently discharges into the creek. With the exception of sanitary sewage, this latter system collects all liquid waste materials from the shop floor drains and from the sumps under the locomotive standing and maintenance areas, plus all storm water drainage from the on-site and off-site catch basins.

The facility handles and stores several types of lube oils and greases as well as diesel fuel. These petroleum products are used directly in the fueling and maintenance of locomotives and rolling stock. The fuel unloading and storage facility consists of the following:

Fixed storage—above ground: two - 200,000-gallon tanks for diesel oil, one - 10,000-gallon tank for diesel oil, one - 5,000-gallon tank for waste oil, two - 19,000-gallon tanks for lube oil, one - 18,500-gallon tank for used lube oil, one - 5,000-gallon tank for car oil. Fixed storage—underground. one - 15,-000-gallon tank for diesel fuel, and one - 10,000-gallon tank for gasoline. Total storage capacity is 501,000 gallons for all petroleum products.

The facility is run on a 24-hour basis. Flood lights are positioned so as to illuminate the office, all buildings, and storage areas.

Diesel fuel oil is brought to the two - 200,000-gallon tanks via large tank trucks. The fuel oil is pumped out of the tank trucks into the storage tanks which in turn supply fuel oil to all loading hoses, the 15,000-gallon underground storage tank that supplies fuel oil for the paint shop furnace, and the 10,000-gallon tank that supplies the power plant. In addition, the railroad has the capability to unload tank cars into the two large 200,000-gallon storage tanks.

The 10,000-gallon underground gasoline storage tank is filled via tank trucks by gravity. This is used only as fuel for company cars and trucks. The two 19,000-gallon lube oil tanks are filled from tank cars. This lube oil is used in the locomotive crankcases. The oil drained from the locomotives during oil changes is pumped into the used-lube oil tank (18,500 gallons) and is then sold to a used oil dealer for reclamation. The 5,000-gallon car oil-storage tank is filled via tank truck and the 5,000-gallon waste oil tank is emptied via tank truck. This waste oil tank stores oily wastes that are separated out by the existing oil separator.

Spill prevention: Storage tanks

(1) All above-ground storage tanks, pumps, pipework and valves are visually inspected for corrosion and/or leaks.

(2) All necessary valves are locked shut when the plant is unattended for vandal protection.

(3) The venting capacity of all tanks is suitable for the fill and withdrawal rates.

(4) Main power switches for the above-ground storage tank pumps are located within a control building and are switched off and the building locked when the facility is unattended.

(5) A dike surrounds each of the two 200,000-gallon above-ground storage tanks. However, because the two tanks are interconnected, neither dike alone has enough capacity to hold the 400,-000 gallons of diesel fuel that could result from a ruptured tank or pipe. Also the present drain lines are open at all times and therefore would allow any spill to flow through the dike.

(6) A dike surrounds the 10,000-gallon above-ground power-plant diesel-fuel storage tank. Its volume is computed, based on the tank volume within (10,000 gallons) and allowance is

made for all additional tank displacement volumes below the dike height.

(7) The above-ground tanks are only filled to within one or two feet of the tank top, depending upon size. This air space at the top allows for expansion of the contents without overflowing the tanks.

(8) The tanks have direct-reading level gauges on the sides.

Spill prevention: Oil-separator system

(1) The oil-separator system is visually checked daily for leaks and/or malfunction.

(2) A periodic maintenance and overhaul program has been established for the oil separator.

(3) No emulsified oils pass through the separator.

(4) Spill containment and retrieval materials and equipment are stored on site.

(5) Separated oil is pumped into a waste-oil storage tank which is periodically pumped out by a waste-oil buyer.

Personnel

All personnel have been instructed and rehearsed in the following spill prevention and countermeasure plans:

(1) No tank compartments are to be filled without prior checking of tank for leakage and of tank valves for closure.

(2) No pump is operated unless attended continuously.

(3) Instruction has been held on oil-spill prevention, containment and retrieval methods. All drivers have been instructed to achieve emergency containment, if possible, and then call the office for help immediately.

(4) Instructions and phone numbers regarding the report of a spill to the E. P. A. and the state water-control board have been published and posted at the office.

(5) Instructions and company regulations concerning oil-spill prevention and countermeasure procedures have been posted conspicuously.

Future spill prevention plans

By this date the following additional plans will have been completed:

(1) Additional on-site storage of spill containment and retrieval materials and equipment, bagged absorbent, screening material and tools.

(2) Provision for a "spill catch system" to be provided, consisting of a portable catch basin and 50-foot length of 3-inch hose to be connected to vacuum pumping system capable of containing leaks.

(3) Warning signs to be displayed to caution personnel to check for line disconnections before departure of railroad tank cars or trucks.

(4) A routine inspection program of tanks, piping, hoses, valves and pumps for the prevention of both major and minor spills or leakage through proper maintenance.

(5) A yearly inspection program that calls for pressure testing of all piping, valves, and pumps where possible.

(6) Should a spill occur that would affect the nearby creek, personnel will have been trained in diking and screening procedures and will be capable of responding immediately.

(7) Connecting the two dikes surrounding the two 200,000-gallon storage tanks and installing either gate valves or vertical extensions on the existing dike drain lines.

It is, therefore, most urgent that all members of the railroad industry become involved in this problem, that we bring our waste under control and that we contain our pollutants to prevent contamination of streams and waterways. If we don't, our hard-earned profits will be used to pay fines instead of dividends, and we will find ourselves up the proverbial creek without a pad-

dle. And the creek will probably be so polluted, we couldn't paddle against it anyway. Thank you.

President Ridgeway: Thank you Mr. Lindsay and Mr. Gunkle.

The next feature on the program is an illustrated address on the manufacture of glu-lam stringers. The presentation will be made by Thomas E. Brassell, director technical services, American Institute Timber Construction. Mr. Brassell.

(Mr. Brassell showed slides and narrated them).

President Ridgeway: Thanks, Mr. Brassell.

The next feature of our program will be a report by Special Committee No. 4. The sponsor of this committee is Director O. C. Denz, supervisor building maintenance for the Milwaukee Road, Chicago. Will Mr. Denz please come forward and introduce his panel.

O. C. Denz: This will be a panel discussion on the mechanical facilities for buildings. Mr. W. C. Sturm, senior project engineer for the EJ&E at Joliet, Ill., will act as moderator. The panel members are F. D. Day, engineer-structures and maintenance, Penn Central; E. B. Dobranetski, senior project engineer for the B&LE; J. L. Gray, vice president, Air Comfort Corp.; and myself.

Selection and Maintenance Mechanical Facilities for Buildings

PANEL DISCUSSION

PANEL

W. C. Sturm, sr. project engineer, EJ&E - Moderator
O. C. Denz, supv. bldg. mtce., C.M.St.P. & P.
F. D. Day, engineer-structures & mtce. P.C.
E. B. Dobranetski, sr. project engineer, B.&L.E.
J. L. Gray, vice president, Air Comfort Corp.

Introduction

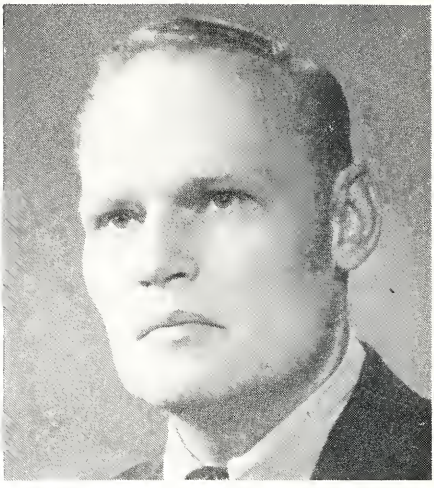
W. C. Sturm: The selection and maintenance of mechanical facilities for buildings have become considerably more complex during recent years. A greater percentage of our facilities are now air conditioned than at any time in the past and the types of systems available are more numerous. In addition, increasing attention must be given to the amount of energy required to provide heating and cooling to our buildings. The use of energy-conserving guidelines for new buildings can result in lower initial costs as well as savings in operating costs. However, situations will arise in which increased initial costs will yield more effective results in energy terms.

As the number and complexity of the systems increase so does the need to provide an adequate system of inspection and preventive maintenance to insure that these systems function properly.

We are fortunate to have with us today a group of panelists who are well

versed in the field of designing and maintaining building mechanical systems. They are Omer Denz, supervisor of building maintenance for the Milwaukee Road; Fred Day, engineer structures and maintenance for the Penn Central; Ed Dobranetski, senior project engineer for the Bessemer and Lake Erie; and Jay Gray, vice president of Air Comfort Corporation.

Although the questions will be directed to members of the panel, we would like to encourage response and/or additional questions from the audience at any time throughout the discussion.



W. C. Sturm

HEATING SYSTEMS

W. C. Sturm: The majority of railroad buildings in areas where there is no central power plant are heated by means of a gas or oil-fired boiler supplying either hot water or low-pressure steam to radiator elements. While this system is generally satisfactory for heating, it does not permit the use of central air-conditioning without the addition of a totally separate system. Do you believe in future designs we should give greater consideration to the use of forced-air systems to permit the use of centralized air-conditioning?

F. D. Day: No. Except for large offices, most railroad buildings are smaller yard offices and locker rooms. At these locations, simple window air-conditioners will do the job.

J. L. Gray: Forced-air heating and ventilating systems should be included in the design of all new buildings. Without the need for natural ventilation, there is greater latitude in the size and placement of windows. Fixed glass can be used extensively. In addition to the heating and ventilating functions, the forced-air systems can be used for summer air-conditioning, winter humidification and year-round air filtering.

In northern climates, however, a separate means of heating the perimeter and entrances of the building is usually required. It is not desirable to offset the total heating load with an overhead air system because the heat loss through the walls and windows can cause downwrafts and cold floors. Perimeter heating can be accomplished by the use of baseboard radiation or in some systems by supplying warm air from the floor level.

W. C. Sturm: In multi-purpose buildings containing both shop and office facilities, do you feel it would be advisable to isolate the office area heating and cooling systems to operate independently?

O. C. Denz: Frequently, the geographic location and nature of the facilities involved require consideration be given to isolating the office area heating and cooling systems to operate independently.

E. B. Dobranetski: Yes, it would be advisable to isolate the heating and cooling systems from offices and shop facilities.

Office temperatures are easier to control due to small volume and definite type of work involved. Activity of office personnel and office machinery do

not affect the heat gain as much as the activity of shop personnel and shop machinery or diesel engines.

Shops must be ventilated to remove exhaust gases and the use of steam heat, gas infra-red or unit-heaters are more effective than units for heating or cooling office areas. However, small shop areas could be included in the system, if analysis of heat gain can be accommodated within the same size unit.

Offices can be economically insulated to use central air-conditioning or heat pumps. This would not be practical in a shop area.

W. C. Sturm: What type of preventive maintenance should be performed on gas or oil-fired boilers to insure their proper operation throughout the heating season? When should this maintenance be performed?

E. B. Dobranetski: At end of heating season:

(1) All heating surfaces should be cleaned thoroughly of soot, ash, and residues and the heating surfaces of steel boilers should be given a coating of lubricating oil on fire side.

(2) All machined surfaces should be cleaned with oil and grease.

(3) Connections to chimney should be cleaned.

(4) Clean and repack glass case.

(5) Clean and paint exposed surface of boiler when needed.

(6) Inspect all accessories, dampers, regulator parts.

Boilers—Effectiveness depends on cleanliness of heating surfaces and free flow of water. Grease and dirt in boiler are the main causes for problems. Fuel changes can cause problems.

Flues at solid-fuel boilers must be cleaned often to keep surfaces free from soot or ash.

Gas boiler flues should be cleaned yearly.

Oil-burning flues should be checked quarterly to determine when cleaning is necessary.

Grease used to lubricate cutting tools during erection of new piping systems serves as a carrier for sand and dirt with results of fines and grease accumulating on the surface of water in all new boilers, heavier particles settle to bottom to form sludge. These impurities can cause foaming, preventing generation of steam, causing an unsteady water line. This accumulation should be removed by blowing off boiler or use a detergent-type cleaner.

Corrosion on the water side of boiler can be prevented by proper water treatment.

F. W. Day: It is good insurance against overtime calls to either have the plumbing and electrical people inspect and test all gas and oil-fired nozzles, valves and controls in September. If this is done, winter maintenance is cut to a minimum.

AIR-CONDITIONING

W. C. Sturm: Air-conditioning of railway buildings has generally been installed on a piecemeal basis over the last 20 to 25 years. The result has been an inordinate amount of individual window air-conditioners having been installed in many of our buildings. At what point do you feel that consideration should be given to the installation of a central system?

F. D. Day: When the electrical load requires re-wiring the main and results in heavy maintenance calls for fuses, circuit breakers or burned wires, it is, of course, time to change to ducts. Normally, offices where over 20 people work full time probably should have duct heat—A/C systems.

O. C. Denz: The number of window-type A/C units required in a building should not be the determining factor in the installation of a central system. Serious consideration should be given to the installation of a central air-con-

ditioning system when a preliminary study indicates the location of the areas to be air-conditioned, the physical condition of the building and conditioned requirements are such that a central system will more economically provide the required conditioned air without certain discomforts to the employees which are frequently associated with air-conditioning. In some instances where the use of building facilities are subject to change or revision, consideration should also be given to anticipated or probably future changes in the operations and relocation of personnel and facilities with the building whereby alterations would be necessary. That would negatively affect the proposed installation of a central system.

E. B. Dobranetski: An office area of 40′ x 60′ with five 10′ x 12′ offices and 9′ ceilings would require approximately .67 tons of air-conditioning per office. This is a window unit of 8 to 10,000 BTU size.

The total office would require 164,000 BTU or 14 tons of air-conditioning. A window unit costs from $300 to $400 installed, whereas, a central unit of 24,000 BTU would cost $900. A heat pump would be $1,200.

The window unit becomes economically unfeasible at three units.

W. C. Sturm: What factors should be considered when deciding to use a central system as opposed to individual window units? What are the advantages and disadvantages of each?

E. B. Dobranetski: Window units have the advantage of:

Low first cost
Individual comfort
Not much maintenance

Disadvantages:

Must provide window or wall opening
Inefficient operating characteristics
Source of heat loss in winter
(5-Year guarantee) 10-year life span
Noise

Central air-conditioning has the advantages of:

Efficiency in operation
20-year life span
Adaptability to convert to heating system
Quiet unit, since fan is outside.

Disadvantages:

Higher first cost
Requires more maintenance
Temperature usually uneven
Duct work required.

J. L. Gray: Several factors that should be considered in determining the type of system to be used include: Size of building, magnitude of the internal heat gain (Occupancy load, light and equipment), projected building usage—short or long-term and availability of space for equipment.

The advantages of window units are:

(1) Low initial cost

(2) Short lead time for purchasing and installing

(3) Individual units provide separate control for small offices and partial cooling for larger offices if one of several units is out of service.

Some disadvantages of window units:

(1) High maintenance costs.

(2) Short equipment life

(3) Appearance of units in windows

Central system advantages:

(1) Longer equipment life and lower life cycle costs.

(2) Better system performance with the ability to provide a more satisfactory year-round air-conditioned environment.

J. L. Gray: Some of the disadvantages:

(1) Higher initial costs.

(2) Longer lead time for design and installation.

F. D. Day: Central heat and air-conditioning should be a part of large new installations unless electric power is

relatively cheap allowing individual motel-room-type units.

For older buildings, the ceiling heights and hallway limitations have to be considered for a supplemental installation.

O. C. Denz: The following should be considered when deciding to use a central system:

(a) The requirements for conditioned air based on the area or areas, personnel and equipment to be served.

(b) The size and type of central system equipment required to furnish or supply the needed conditioned air necessary to satisfy the air requirements and provide the personnel working in the area or areas with suitable air-conditioning.

(c) The economics of the proposed installation from the standpoint of installation, operation and maintenance costs.

W. C. Strum: A large portion of the heat gain in any building is due to solar radiation on glass areas. What steps can be taken to lower the heat gain due to solar radiation when designing or remodeling facilities? Overhangs, less amounts of glass, landscaping, location on site?

J. L. Gray: Solar radiation can be reduced by using less glass, replacing clear glass with glass block, increasing overhangs on one-story buildings, using inside blinds or outside metal awnings.

In the last few years, solar control films have been developed and marketed under 2 or 3 trade names. These films, which contain a thin coating of aluminum, reflect up to 80% of the solar heat while permitting light to enter.

Solar films have been installed on the windows of existing buildings and, also, in new buildings because they are less expensive than solar-tinted glass.

F. D. Day: For yard office buildings and tower installations, aluminum awnings do a good job.

W. C. Sturm: Certain areas, such as computer rooms, require year-round air-conditioning. What type of system is best suited for these applications? Should these rooms be provided with air-conditioning independent from the remainder of the building?

J. L. Gray: Computer rooms should have units or systems that are completely independent of the main building system. Cooling is normally needed 12 months of the year in computer rooms, while the bulding equipment will be shut down for 4 or 5 months. Also, more precise control of temperature, humidity and airborne dust particles is required.

Computer room air-conditioning equipment, either air-cooled or water-cooled, is available from several manufacturers. These units are pre-engineered packages which are complete with several steps of reheat, high efficiency filters, humidifiers and temperature and humidity controls.

In some locations, where greater tolerances in room conditions are permitted, a standard unit can be modified to serve the same purpose for less cost.

W. C. Sturm: We are all becoming more aware of the need to conserve energy, air-conditioners now have evaluated energy ratios. What is considered to be an optimum BTUH/WATT rating?

J. L. Gray: The energy efficiency ratio, also known as EER, for room air-conditioning units varies from 6 to about 11 BTU per watt. Air-Cooled package units fit into about the same range. It is interesting to note that water-cooled units, which were widely used 15 years ago, have an EER of 11 to 13 or 14 BTU per watt. These ratings may be misleading in that no allowance has been made for pumping or treating of condenser water.

One of the local utilities considers

a unit with an EER of 8 or more to be an energy-saving unit. Air-conditioning equipment can and will be made more efficient. However, it is difficult to determine if and how much more the air-conditioning buyer is willing to pay for increased efficiency. Most equipment and systems are purchased on the basis of the first cost without much consideration for the cost of operation.

W. C. Sturm: What type of periodic inspection and maintenance should be performed on air-conditioning units and systems?

O. C. Denz: Window-type A/C units should be checked and properly serviced once a year or more frequently if the nature, location and use of the units is such as to warrant additional service. Prior to each air-conditioning season, the dirt and dust should be removed from the condenser of each window-type A C unit in service. This can best be accomplished by removal of the unit from the window and blowing the accumulation from the condenser; the fan motor should be oiled, the fan and belt checked and belt adjusted as necessary; the units should also be checked for loose wiring and contacts, as well as malfunctioning controls. In addition, clean filters should be installed about every two months or more frequently if conditions require.

Central air-conditioner units should be thoroughly checked or inspected at least annually at which time the condensers should be cleaned, all controls checked, motors oiled, belts checked for replacement or adjustment and bearings greased. Filters should be checked monthly and replaced as required. If unit is operated during winter months, the compressor oil-heaters should be turned on in advance of the cold weather.

E. B. Dobranetski: Periodic inspection and maintenance:

Window Units:

Clean filters every year
Pull and inspect unit annually
Clean coils, condenser, fan, etc.
Check sealed bearings—probable life of 5 years

Central Units:

Lubricate unit in Spring or Fall
Inspect coils yearly, clean as required
Check duct work connections where accessible for tightness, clean grills, check thermostat.

F. D. Day: Air-conditioners overload rapidly if filters are not changed. Modern units with throw-away filters are easily maintained. Of course, oil on the fan bearings help considerably. Many failures are due to thermostat tinkering. A solid-box well disguised is the best bet.

J. L. Gray: In my opinion, the air-conditioning equipment in commercial and industrial buildings should be inspected and maintained once a month during the cooling season and every other month during the rest of the year. An inspection should include, as a minimum, changing the air-filters if dirty, inspecting the condenser and evaporator coils for dirt, and checking the controls and operation of the unit.

The Spring inspection for starting the cooling equipment and the Fall inspection for starting the heating plant are the most important. The work performed at these times should be thorough and complete as many future operating problems can be eliminated.

A good program of preventive maintenance will become even more necessary as the cost of energy increases.

W. C. Sturm: On what criteria do you decide whether to replace or repair a window air-conditioning unit.

F. D. Day: Where the cost to repair is more than 70% of a new unit.

E. B. Dobranetski: Replace or repair window units:

Location—is it built into wall or window

Size—built in requires same shell size

Cost—parts and labor vs. installation

Age—window units 10-year expected life

O. C. Denz: With window-type A/C units we normally keep them in service with maintenance such as replacement of motors, fan blades, switches, etc., so long as the compressor and coils are operable. If the compressor fails and the unit is still under the manufacturer's warranty, we return it to the supplier for replacements per warranty. However, if warranty has already expired, we salvage some needed parts and scrap the unit. In other words, the condition of the compressor for the most part determines the status of the A/C unit.

VENTILATION

W. C. Sturm: A simple method of removing hot or contaminated air from buildings is through the use of powered roof-ventilators. Two primary types of ventilators are used, centrifugal and axial; what are the advantages and disadvantages of each of these types.

O. C. Denz: Axial ventilator units should be used in instances where a large volume of air needs to be removed to the atmosphere from the upper section of a building such as through a roof ventilator setting atop a diesel house roof.

Centrifugal ventilator units have better capacity for funneling a large amount of air through duct work, etc.

F. D. Day: Power ventilations get dirty and wear out rapidly. Simple, large static ventilation is best.

W. C. Sturm: What type of inspection and preventive maintenance do you recommend for power ventilators? At what frequency?

F. D. Day: For power ventilators on engine blowers, an annual Spring cleaning, oiling and check of controls is recommended.

E. B. Dobranetski: Under normal circumstances, handling clean air, the system will require cleaning about once a year. However, the fan should be checked at regular intervals to detect any unusual accumulation. Fans, in a corrosive environment, should be checked more often.

A scheduled inspection is recommended. Particular items should include:

(1) Bearings for overheating (greasing as required)

(2) Belt drives for proper tension

(3) Fan wheel for proper rotation and freedom from accumulations.

Accumulations on a wheel cause vibrations that can normally be detected as bearings are checked. Fan rotation is often reversed, accidentally, with repair or alterations to wiring circuits or starters. As fans do move a fraction of their rated capacity when running backward, such incorrect operation often goes unnoticed, in spite of less effective performance.

ELEVATORS

W. C. Sturm: It is becoming increasingly popular to include elevators in the design of buildings exceeding two stories in height, under what circumstances would you recommend including an elevator in the design of a building?

F. D. Day: At three to five-floor towers an elevator is highly desirable. Many good older trainmen and yardmasters will not bid jobs requiring climbing. Generally, only a four-man capacity is needed.

O. C. Denz: I certainly am not adverse to the installation of elevators, as needed, and am of the opinion consideration should be given to the installation of an elevator or elevators in buildings exceeding two or more stor-

ies where the freight (including material and supplies, etc.) and/or personnel movements warrant. In some instances, special equipment such as this must be provided for handicapped personnel.

W. C. Sturm: Periodic inspection of elevators by State or Municipal inspectors is required in many localities; what additional inspection or preventive maintenance procedures would you recommend?

F. D. Day: Elevators do not take much maintenance mechanically. Other than grease and mandatory cable changes. Electronics nowadays require, for practical purposes, a factory contract.

GENERAL

W. C. Sturm: Do you have a system-wide record of heating and air-conditioning units indicating the date and nature of inspections, preventive maintenance and repairs?

O. C. Denz: We do not have a system-wide record of our heating and air-conditioning units. Each division office generally tries to keep the records necessary for the proper inspection, maintenance and repair of such units on their division.

A record is kept in our General Office concerning the inspection, maintenance and repair of the large boilers over the system.

E. B. Dobranetski: We do not have a set procedure for keeping records for historical data. Work reports are made and filed, but do not constitute complete record keeping.

The Bridge and Building Department maintains a file by building location for equipment of this nature including:

Purchase Order information
Date installed
Operation, installation and maintenance instructions

But this file does not include:
Inspection reports
Preventive maintenance
Repairs

I must add though that when equipment has failed, or becomes faulty in opeartion, that the purchase order for replacement parts, if not obtained locally or out of stock, serves for a repair record.

W. C. Sturm: What improvements do you feel could be made in your current method of inspecting and maintaining building mechanical facilities?

F. D. Day: More careful check-up to see if assigned work gets done.

O. C. Denz: The cost and expense involved in the inspection, maintenance and repair of such facilities could no doubt be substantially reduced if the required personnel could be employed to properly supervise the inspection, maintenance, and repair of such facilities.

E. B. Dobranetski: Too often work is done only when a piece of equipment fails, this leads to progressive failure of a complete system or unit.

Generally, railroad facilities are not the most up-to-date and through remodeling, changes in operating requirements or conditions, mechanical equipment may be overlooked and required to continue functioning at peak performance. This change in operating conditions will shorten equipment life and cause progressive maintenance problems, until replacement of equipment is required.

Accounting practices require that the life of buildings be used in computing rate of depreciation and, through some magical formulas, tell us how much can be spent for property maintenance. Mechanical equipment may require earlier replacement than structure, but due to budget allowances, you must make it work for just a few more years. Without adequate records, a maintenance department does not accumu-

late enough substantive evidence to present a good case for more budget. The penalty for deferred maintenance, due to a limited budget, results in unplanned expenditures becoming necessary at the least opportune time. This is tantamount to "Murphy's Law":

For inspecting and maintaining mechanical facilities, the following improvements are imperative:

(a) Company personnel be trained to inspect equipment by manufacturer.

(b) Major systems should be contracted, where labor agreements permit, for a maintenance agreement when initially installed.

(c) Preventive maintenance should be performed yearly or oftener as conditions require.

(d) Operating and maintenance manuals should be kept convenient to equipment or building.

(e) Major mechanical equipment should have operating instructions, for emergency operations (shutdowns) framed, on equipment, in open view.

(f) Energy consumption of major systems should be tabulated.

CONCLUSION

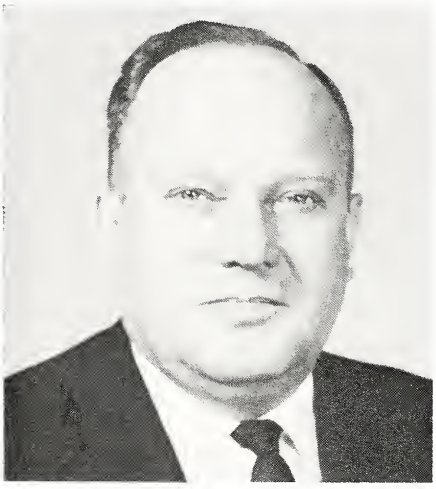
W. C. Sturm: Today we have attempted to bring to your attention some of the problems in the selection and maintenance of building mechanical facilities. The need for adequate attention to potential maintenance problems is apparent. Only by proper initial selection of equipment, thorough and periodic inspection of each facility and the performance of specific necessary preventive maintenance can we reasonably expect our mechanical facilities to perform at their rated capacities over a reasonable serviceable life. Neglect of these procedures is an economically unsound policy as it will cause increased energy consumption and cost and premature replacement of the facility. I would like to take this opportunity to thank the members of the panel for their informative and pertinent comments. This concludes the report of special subjects committee No. 4.

President Ridgeway: The last presentation will be a special report on the development of a manual and instructions on training of B&B foremen. Mr. E. E. Runde, manager construction, Illinois Central Gulf, Chicago, and immediate past president of the B&B Association, is in command of this committee. Erv will explain to you the purpose and make the first committee report.

B&B Foreman's Training Manual

By E. E. RUNDE

Manager of Construction, Illinois Central Gulf, Chicago



E. E. Runde

The suggestion was first made during the 1973 Convention that a B&B Foreman's Training Manual should be developed by this Association. Following that convention, Past President Bryant wrote to a number of chief engineers throughout the country and the response indicated that most railroads were very definitely interested in such a manual; only one already had such a program.

During my term as President 1973-74, I developed additional information on the subject and obtained copies of various track foreman and other types of training programs from those railroads who had developed one. Since the proposed B&B Foreman Training Program was still in the formative stage, no report was made at the 1974 convention other than to advise that it was being considered.

Following the convention last year, President Ridgeway asked me to continue as Chairman of the Training Program Committee and I accepted but immediately found that I had a bear by the tail, so to speak, since the training program information I was receiving not only was very voluminous and required hours of reading but also gave all indications that preparation of a training manual would be a full-time job for one man.

At the December 1974 meeting of the Board of Directors, I reported my progress and requested assistance and at that time it was decided that since it might take several years to develop a training program, it would be advisable to establish a committee to work on it. Thus, it was decided that each year the immediate Past President of the association would act as Chairman and the President and three Vice Presidents would form the remainder of the committee.

This has worked out extremely well and this committee has managed to meet either immediately before or after each quarterly board meeting during the past year.

The Recommendations for Establishing a Training Program for B&B Foremen, a six-page outline with 12 parts and numerous sub-parts listed in the order of priority, is the result of this year's committee work.

During the coming year Mr. Ridgeway will chair this committee and additional training-program information will be developed. It is the intent that the program will be expanded upon each year and it is hoped that within

a very few years a program for training B&B foremen will be developed which will be of assistance and guidance to all railroads. I am sure the committee would welcome any suggestions you might have and you are urged to send these to Mr. Ridgeway.

Following is the committee's suggestions for starting your own Foreman Training Program.

Recommendations for Establishing A Training Program for B&B Foremen

(1) Obtain management sponsorship and approval.

(2) Obtain labor organization sponsorship and approval.

(3) Select a training officer and knowledgeable instructors.

(4) Determine how trainees will be selected.

(5) Determine the duration of training.

(6) Select the locations for holding classes.

(7) Determine the necessary equipment and supplies required for conducting the course.

(8) Prepare an agenda for classroom and field instruction.

(9) Define the purpose of the program to the trainee.

(10) Develop a method of evaluating trainee progress.

(11) Determine present and future status of those who complete the program.

(12) Investigate use of the training program as a refresher course.

(1) Obtain Management Sponsorship and Approval

1. Define the purpose of the program, the need for it and what it is expected to accomplish.
2. Determine the value and benefits to the company to be derived from the training program.
3. Determine the cost of the training program per trainee.
4. Determine the cost of training per year of remaining service life of those participating.
5. Determine the return on investment to the company.

(2) Obtain Labor Organization Sponsorship and Approval

1. Explain that the trainees' chances for advancement will be improved.
2. Explain that the trainees' ability to communicate will be improved.
3. Explain that the trainees will have a better knowledge of management's goals.
4. Explain the method by which trainees will be selected.
5. Explain the employees job classification during the training period.
6. Explain the status of trainees who fail to pass the course.
7. Determine if the labor agreement must be revised.

(3) Select A Training Officer and Knowledgeable Instructors

1. Determine the qualifications and experience required.
2. Determine the availability of company employees as instructors.
3. Prepare a list of company instructors to conduct the programs.
4. Prepare a list of other instructors (such as manufacturers' representatives) to assist in conducting the program.
5. Consult with B&B Supervisors and General Foremen.

(4) Determine How Trainees Will Be Elected

1. Determine the basic requirements for selection.
2. Determine the maximum and minimum ages for eligibility.

3. Determine if aptitude testing will be required.
4. Determine the minimum length of service for eligibility.
5. Determine if seniority rating is to be a factor in the selection.

(5) Determine the Duration of Training

1. Determine the classroom time required per subject.
2. Determine the field time required per subject.

(6) Select the Locations for Holding Classes

1. Compare costs of small local classes vs. large headquarters classes.
2. Determine the availability and desirability of using a company rail car as a mobile classroom.
3. Determine the locations for classrooms instructions.
4. Determine the location for field instructions.
5. Determine the availability of the training staff to classroom locations selected.
6. Determine the avaliability of the field training staff and equipment to the location selected.

(7) Determine the Necessary Equipment and Supplies Required for Conducting the Course

1. Determine the types of audio-visual aids and models needed.
2. Prepare an information package for each trainee.
3. Furnish complete package of company's standard drawings.
4. Furnish information on correspondence courses pertinent to the trainee's work.

(8) Prepare An Agenda for Classroom and Field Instruction

1. Scope of subjects for each instructor.
2. Schedule for each instructor.
3. Company organization structure and policies.
4. Nomenclature.
5. Reports.
6. Safety.
7. Plan reading.
8. First Aid.
9. Handling Men.
10. Dealing with the public.
11. Emergencies.
12. Planning the work.
13. Communications.
14. Requisitions, local purchases, company credit cards.
15. Handling and transportation of materials and equipment.
16. Train movement and schedules.
17. Payroll handling and accounting.
18. Maintenance of Way Book of Rules.
19. Maintenance of Way Agreement.
20. Materials.
21. Equipment and tools.
22. Inspection Methods.
23. Crafts.
24. Company-sponsored Tuition Program (if any).

(9) Define the Purpose of the Program To the Trainee

1. Increased efficiency.
2. Improved leadership.
3. Improved quality of work.
4. Improved promotion potential.
5. Training of foremen for general B & B work.
6. Improved employee relations with management.
7. Improved employee morale.
8. Improved employee safety.

(10) Develop A Method of Evaluating Trainee Progress

1. Establish requirements for satisfactory completion of the course.
2. Determine type of certificate to be awarded for completion.

3. Prepare written tests on classroom work.
4. Require periodic report from trainee on field training.
5. Require periodic evaluation of trainee by supervisor.
6. Obtain feedback of graduate's performance from B&B supervisor.

(11) Determine Present & Future Status of Those Who Complete Program

1. Promotional consideration to be given.
2. Management policies.
3. Effect of Maintenance of Way Agreement.
4. Determine title of graduate trainee.

(12) Investigate Use of the Training Program As A Refresher Course

1. Determine the need.
2. Determine participants who are in need.

President Ridgeway: This concludes the meeting for today. Now, once more, thanks to all members and guests who were involved in any way with the presentation of these fine reports. Before adjourning, I would like to remind you of the REMSA banquet tonight.

The final session of this convention will begin at 9:30 tomorrow morning, in this same room and will open with our annual business session. Two very excellent phases are the election and installation of officers. The meeting is adjourned.

MORNING SESSION

September 17, 1975

President Ridgeway: Will the meeting please come to order?

Good morning, members and guests. Welcome to this our final session of the 80th Annual Convention. Total registered at this time is 732.

The REMSA banquet, which as always is a most gala affair, was attended by 790 people last evening.

Will all the members of the Executive Committee of our Association please come forward so that we can begin our business session? The following reports are for information and enlightenment for each and every member of the Association. If there are any questions arising in your mind about any of the reports to be given, we would appreciate it if you will hold your questions until all business reports have been presented, at which time we will attempt to answer your questions.

BUSINESS SESSION

President Ridgeway: Mrs. Ann Wilson, if you recall, was unable to be present during the introduction of officers on Monday afternoon. Mrs. Wilson is with us this morning and will present the Secretary's report. Mrs. Wilson.

Secretary's Report

Report of Membership as of September 8, 1975

ACTIVE MEMBERSHIP			
Total Active Members, September 25, 1974		452	
New Active Members since September 25, 1974		44	
Reinstated—Paid back dues		5	
		501	
LESS: Resigned account retirement, etc.	23		
Transferred to Associate	4		
Transferred to Life	15		
Dropped for Non-payment of dues	33		
Deceased	1	76	
TOTAL ACTIVE MEMBERS			425
ASSOCIATE MEMBERS			
Total Associate Members, September 25, 1974		77	
Transferred from Active		4	
New Associate Members since September 25, 1974		6	
Reinstated—Paid back dues		1	
		88	
LESS: Dropped for Non-payment of dues	1		
Resigned	2	3	
TOTAL ASSOCIATE MEMBERS			85
LIFE MEMBERS			
Total Life Members - September 25, 1974		145	
Transferred from Active Membership		15	
		160	
LESS: Reported deceased		7	
TOTAL LIFE MEMBERS			153
HONORARY MEMBERS			
Total Honorary Members September 25, 1974		9	
TOTAL HONORARY MEMBERS			9
TOTAL MEMBERSHIP ALL CLASSES - September 8, 1975			672

President Ridgeway: Thank you, Mrs. Wilson.
Mr. Huffman, will you please present the report of the Treasurer?

Treasurer's Report

Period September 1, 1974 to August 31, 1975

Checking Account balance August 31, 1974		$ 1,948.63
RECEIPTS		
Dues	$ 3,920.00	
1973 Advertising	2,727.57	
1974 Advertising	13,522.79	
1974 Convention Registration Fees	2,514.14	
Miscellaneous	14.00	22,698.50
		$ 24,647.13
DISBURSEMENTS		
Salaries (Secretary & Assistant)	3,343.20	
FICA (On payroll)	195.58	
Office Rent, Telephone, Etc.	539.34	
Stationery & Printing	830.11	
Postage	399.93	
Office Supplies	238.20	
1973 Advertising (The American Publishing Co.)	2,840.28	
1974 Convention Expense	213.70	
State of Illinois Unemployment Tax	8.84	
Federal Unemployment Tax	8.82	
1974 Proceedings	3,124.69	
Executive Board Meetings	408.14	
1974 Advertising (American Publishing Co.)	5,197.90	
Membership certificates	50.68	
Contributions	300.00	
Miscellaneous	2.00	
1975 Convention	75.00	17,776.41
CHECKING ACCOUNT BALANCE August 31, 1975		$ 6,870.72
Homewood Federal S/L Assn. (5¼%)		3,040.87
Homewood Federal S/L Assn. (6¾% 2/29/78)		5,702.61
Homewood Federal S/L Assn. (6¾% 8/2/77)		2,185.74
		$ 17,799.94

President Ridgeway: Thanks, Mr. Huffman.

Mr. Schlaf will now present the report of the Auditing Committee.

Report of Auditing Committee

TO MEMBERS OF THE AMERICAN
RAILWAY BRIDGE & BUILDING ASSOCIATION

Gentlemen:

The undersigned have examined the books of the Secretary and report of the Treasurer for the period from September 1, 1974 to August 31, 1975 inclusive, and have found them to be correct as of the latter date.

Respectfully submitted,
E. R. SCHLAF, Chairman
HENRY F. LUCAS
H. M. WILSON

President Ridgeway: Thank you, Mr. Schlaf.

You have heard the reports of the Association's Secretary, Treasurer and Auditing Committee. Is there any discussion from the floor. If not, I would entertain the motion that the reports be accepted as given. (Motion is made). Is there a second? (Motion is seconded). It has been moved and seconded that the reports be accepted. All in favor say "Aye," opposed "no." Motion is carried.

Our Mr. Jim Payne, chairman of the Resolutions Committee, will now give his report. Mr. Payne.

Report of Resolutions Committee

Mr. President, at the close of this 80th Annual Convention of the American Railway Bridge and Building Association, the Resolutions Committee offers the following resolutions:

BE IT HEREBY RESOLVED that the thanks of the Association be extended to Dr. Kenneth Hildebrand, pastor emeritus, Central Church of Chicago for his message of spiritual assurance.

BE IT FURTHER RESOLVED that the thanks of the Association be expressed to the prominent speakers who gave of their time and so capably shared their wisdom and counsel with us, especially AREA President, Mr. John T. Ward; Chairman and Chief Executive Officer, Seaboard Coastline Industries, Inc., Mr. W. Thomas Rice; Director of Corporate Relations, Illinois Central Gulf, Mr. C. G. Massoth; Chief Engineer, Chessie System, Mr. J. W. Brent; President, Bessemer & Lake Erie, Mr. M. Spalding Toon; Administrator, Federal Railroad Administration, Mr. Asaph H. Hall; Chief Industrial Engineer, Bessemer & Lake Erie, Mr. M. L. Manion; Bridge Engineer-System, Atchison, Topeka & Santa Fe, Mr. W. R. Hyma; Director of Technical Services, American Institute of Timber Construction, Mr. Thomas B. Brassel; Chief Engineer, Associated Pile & Fitting Corporation, Mr. Hal W. Hunt; Engineer Bridges, Southern Pacific Transportation Company, Mr. T. L. Fuller; President, Railway Engineering Maintenance Suppliers Association, Inc., REMSA, Mr. H. D. Campbell; and to all members of the Railway Engineering Maintenance Suppliers Association for the fine banquet and entertainment which we enjoyed last evening.

BE IT FURTHER RESOLVED that our thanks be expressed to Mrs. J. J. Ridgeway and Mrs. W. H. Johnson and their committees for their efforts in arranging registration and entertainment for our wives, and to the untiring efforts of the ladies who assisted as hostesses.

AND, BE IT FINALLY RESOLVED that the Association express its thanks to its Chairmen and their committees for their fine work in preparing the reports which were presented at the convention; also to the Chicago, Rock Island and Pacific Railroad, Atchison, Topeka and Santa Fe, Chicago and North Western Transportation and Chicago, Milwaukee, St. Paul and Pacific Transportation Company who provided assistance at the registration desk, to the management and staff of the Hyatt Regency Chicago for their cooperation and hospitality, as well as to the members of our executive committee and to our President, Mr. J. J. Ridgeway, who has spent so much of his own personal time and effort in guiding the affairs of our Association over the past year.

Mr. President, we recommend these resolutions be made a part of the official record of this association.

Respectfully submitted,
Jim Payne, Chairman

President Ridgeway: Thanks, Mr. Payn.e. We will next hear the necrology report. Mr. Hughes will present that report.

Report of Necrology Committee

1974 - 1975

To the President and Members of the
AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION:

It is with grief and regret that we report the known loss of eight (8) members through death during the past year. It is possible that other members have passed away during the year of whom we have no information. If you know of any, please report their names to the Secretary. The following have been reported since our last Annual Meeting in September 1974.

Active Members	Title—Railroad—Location	Joined	Deceased
J. H. Stinebaugh	Supvr. Water Serv. & Rdwy. Mach. Illinois Central Gulf R.R. Carbondale, Ill.	1951	1975
Life Members			
M. Block	Asst. to Ch. Engr. Illinois Central Gulf R.R. Tulsa, Okla.	1948	1975
V. E. Engman	Ch. Carpenter C.M.S.P.&P. R.R. Minneapolis, Minn.	1920	1975
J. M. Hopkins	Sr. Project Eng. Elgin, Joliet & Eastern Ry. Co. Joliet, Ill.	1958	1974
A. C. Jones	B. & B. Supvr. Southern Railway Birmingham, Ala.	1938	1974
W. G. Mateer	Mgr. Purchase & Stores Elgin, Joliet & Eastern Ry. Co. Joliet, Ill.	1944	1975
L. Mayfield	Principal Asst. Engineer Missouri Pacific R.R. Shreveport, La.	1944	1974
C. A. J. Richards	Asst. Supvr. Structures Pennsylvania R.R. Lakeland, Fla.	1924	1975

Respectfully submitted,
C. H. Hughes, Chairman

President Ridgeway: Thank you, Mr. Hughes. All please stand for a moment of silence.

Each year three new directors are elected to serve our Association and each year after three years of devoted service, three directors leave the board. Continuing our practic started several years ago, at this time I would like to present Certificates of Appreciation to the three retired directors. Mr. Davidson, Mr. Hughes and Mr. Hyma, please come forward. (Presents certificates).

We realize that no amount of records can actually repay you for the many, many hours that you have spent carrying out the Association's business during the three years that you have served as directors. I know that you have taken time, you have taken your personal time to conduct the affairs of our Association. These pieces of paper are only a symbol that I, and all 700-plus members of this great Association, appreciate and will be forever grateful for your contribution.

Is there any further new business? If not, he business session is adjourned, and the members of the Executive Committee are excused.

Next on the agenda is an illustrated address on current procedures and design of piling. The presentation will be made by Mr. Hal W. Hunt, P.E., chief engineer, Associated Pile & Fitting Corp., Clifton, N.J. Mr. Hunt.

Current Practices in Pile Foundation Design and Construction

By HAL W. HUNT, P.E.

Chief Engineer, Associated Pile & Fitting Corp., Clifton, New Jersey

More powerful hammers are being used to drive lighter piles to greater resistance. In other words, the pile may be caught between an irresistible force and an immovable stratum and get badly beat up if adequate protection is not provided.

Demand for economies encourage the designer to reduce material cost to a minimum. This can be successful only if done with full information on the underlying materials and a real knowledge of the forces transmitted to the pile by a hammer of the proper energy. An understanding of construction procedures and costs is essential to design for overall economy. For example, the designer may feel he is saving money by sloping the top of pile caps or footings to save a little concrete. Or he may use separate, small pile caps under each column of a bridge pier rather than a continuous footing. Almost always the field cost of forming and shaping these refinements will be far more than the savings. The designer may specify a pipe with thinner wall than can be driven efficiently. For the relatively few piles needed at most railroad bridges a little more spent for heavier wall pipe may prevent long delays.

Hal W. Hunt, P.E.

The designer cannot expect that a change will be made at the discretion of the field forces. They do not know what special stresses the designer had in mind; an inspector will insist on a change order and revised plans. The designer should think through possible economies from a constructor's point of view and put options on the plans. Planning and bidding can then be on the least costly method. Often these questions come up one to three or more years after the designer made, shelved and forgot the plans, so considerable effort is required to determine if even a minor change can be made.

Quite large hammers have become readily available. Drop hammers have reached at least 10,000 lb. Steam hammers have grown from the old favorites, Vulcan No. 1 or MK-T 9B3 or smaller, into offshore giants that have energy up to 600,000 ft. lb. Air, from portable compressors, powers up to 60,000-ft, lb. hammers; the big offshore hammers can operate with air but steam is preferred. Diesel hammers range up to 300,000 ft. lb.

Diesel hammers are gaining favor

Diesel hammers are rapidly gaining acceptance in most areas of the country and should be especially convenient for railroad work. Some engineers still are not sure how to evaluate actual energy as the gravity blow is cushioned a little by compressing the fuel to ignition pressure. Some environmentalists claim the diesel fuel is not completely burned. Diesel protagonists counter that the much larger amount of fuel required to power the air compressor, which runs at idle much of the time, has a far greater potential for pollution. Diesel hammers appear to do less damage to at least the visible top of a pile. A factor may be precompression holding the head tightly in position before the blow is struck.

McKiernan-Terry, Bermingham (Hamilton, Ont.), and others have developed parrallelogram-type leads that can be attached to a crane operating on rails. It can reach to either side of the tracks and orient H-piles in a desired position.

Point protection for all types of piling has made it practical to use lighter weight H- or pipe, or fewer piles. Improved cushion blocks in hammers give a stronger blow and develop better load-carrying capability.

George Goble at Case Western Reserve University has developed an electronic device that takes pile size, weight, hammer energy and acceleration and translates them instantly into ultimate load-carrying ability for the pile driven. For the State of Ohio and the Federal Highway Administration, Goble is currently testing three piles driven with each of five hammers. A Link Belt 520 (26,300 ft. lbs.), a Vulcan 08 (26,000 ft. lb.), a Kobe 13 (24,400 ft. lb.), a Kobe 25 (50,000 ft. lb.) and, experimentally, a MK-T 9B3 (8,700 ft. lb.) hammer—each drove a vertical pile, a pile on a 1:4 batter and a

vertical pile with a Pruyn Point. Associated Pile & Fitting Corp. sponsored adding the Pruyn Points in the test.

The piles are at the intersection of Ohio routes 4 and 2, three miles south of Sandusky. They are being statically loaded for comparison with the electronic analysis. They will then be pulled for a look at the tip end.

On the basis of quick read-outs from the electronic device, the sound of the hammer and the "ring" of the pile, concensus of the driving crew and the engineers is that several of the piles without point protection may not be satisfactory. Those with Pruyn Points all appeared to be in excellent condition. It will be informative to see the pulled piles.

Enough for generalities. Some pictures will give you an idea of some of the pile types, the hammers and the equipment currently used.

A problem for many railroad bridge engineers is crossing boulder-filled valleys where flash floods have deposited rocks up to suitcase size to a depth of many feet. The material is compact and is difficult to penetrate with piling or even to excavate. It probably would support structures on spread footings on the surface. But scour moves those boulders around to considerable depth, especially where piers are an obstruction in the channel.

It has been found that H-piles with cast-steel point protection can be driven into the stream bed to the necessary depth. They do not all go exactly straight, but with a little care in driving they can be adequately aligned for support bents.

Why cast-steel tips? Some tests recently made at Fritz Engineering Lab at Lehigh University—and some simple theory—give the answer. First the theory:

Flange corners can be expected to buckle

Corners of flanges of H-piles are theoretically susceptible to buckling before full plastic moment develops under load. Except for HP 10 x 57 the ratio of flange width to twice the thickness, b/2t, exceeds 8.5—the limit suggested for ASTM-A36 steels. The b/2t limit is for a section of beam between lateral supports. For resistance to buckling of a pile flange corner a much lower ratio of b/2t is more desirable than the 8.5.

All rolled sections have residual stresses formed as the steel cools during and after rolling. The flange outside corners, which cool first, have a **compressive** residual stress; the webs have a **tensile** residual stress. Tests on wide-flange steel shapes show the compressive residual stress at the flange corner is 13 ksi.

In considering buckling, the stress from driving must be added to the 13 ksi. For example, it is known that for a particular pile cross-section the flange theoretically will buckle at 20 ksi; an applied added stress of only 7 ksi would be likely to cause buckling. This hypothetical example shows how critical the flange corner can be when it encounters resistance to driving.

For the web area, which has a **tensile** residual stress of around 7 ksi, an applied stress of 20 plus 7 ksi (27 ski) would be required to buckle the web. Since pile sections have the same web and flange thickness, the pile tip performs far better when the web is first to meet driving resistance. This explains why driving piles with Pruyn Points is successful while H-piles installed without point protection are so variable and undependable.

The residual stress patterns explains to some extent why the flange is found torn from the web on so many piles exposed by excavation or pulling. The highest tensile residual stress is at the

junction of web and flange. When the tensile stress generated by buckling is added, the flange will tear from the web at stress levels lower than the yield stress.

Pile points overcome the unfavorable geometry of the pile cross-section in several ways. They have more favorable b/t ratio than the pile cross-section; they do not have the unfavorable residual stress distribution that exists in the pile section; they tend to distribute the load more uniformly over the cross section of the pile regardless of what area first encounters resistance; they provide bracing for the delicate flange corner. Transfer of the load to the web of the pile is the best way to improve the driving performance of the pile.

Attempts to brace the flange tips by means other than a fully encompassing cast-steel driving point have not been successful because the end of the pile is still exposed to the point resistance encountered in driving. The load distribution function of the driving point is very important.

Laboratory testing

Laboratory simulation of driving piles is difficult to achieve because of the extremely variable conditions of soils and driving. With guidance by Dr. Roger Slutter, Operations Director at Frizt Engineering Laboratory at Lehigh University, Associated Pile & Fitting Corp. sponsored full-scale tests on sections of HP 10 x 42 about 4 ft. long axially in compression. Various end conditions, which may be similar to driving conditions, were produced by supporting the pile-end differently in a laboratory testing machine. As the steel yields a whitewash coating flakes off showing the areas of initial and progressive plastic deformation.

Movement under load for piles loaded on the flange tips, with and without a driving point, is compared in Fig. 1. The pile without the driving point starts to yield at about 50 KIPS and yielding continues until flange-tip buckling occurs at 150 KIPS. After buckling occurs, the pile is not able to support additional load.

The pile with Pruyn Point 75750 behaved similarly. Yielding of the flange tips began at a much higher loading and progressed until the four flange tips gradually buckled. It appears from the slope of the loading curve that even during buckling the pile with Pruyn Point 75750 continued to accept additional load. This could be due to the restraint imposed by the welds and by the unyielded section of the flange above the buckle. The value of point reinforcement is plainly evident.

When cast-steel point protection is used, the flange tip is joined to a section thicker than itself, producing a very rigid end. When this rigid end strikes rock, it is much less likely to sustain damage; when damage does occur, the driving force at which it occurs is much higher. When the rigid end strikes rock, the rock is likely to break or move before the pile sustains any damage.

The cast-steel point covers the end of the pile unifying flanges and web so they resist distortion as a unit. There is a natural area of weakness at the intersection of web and flange of an H- or wide-flange section due to rolled-in stresses at this abrupt change of shape. It is here that unprotected pile ends frequently start to fail as the flange is pulled from the web if obstructions are encountered in driving. The cast-steel point gives added strength to resist spreading of the flanges if a boulder happens to drive in between them.

When driven to steeply sloping rock the Pruyn Point can be especially effective in getting a toe hold and providing added support for the pile. If the can be oriented so the flange is parallel to the slope, the tapered points

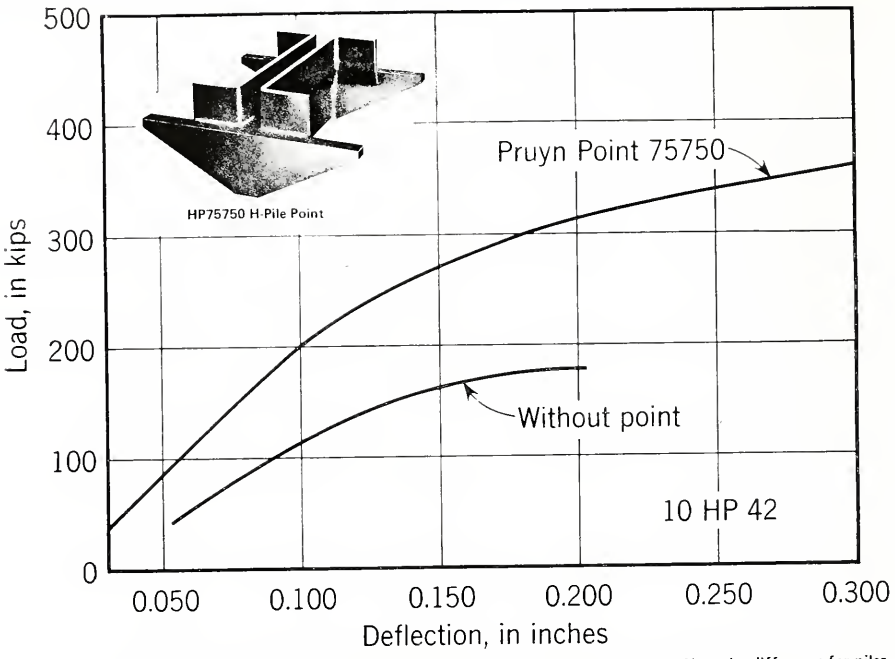


Fig. 1. Movement under load for HP 10 x 42 loaded on the flange tips only. Note the difference for piles with and without Pruyn Point protection.

(75750, for example) can be most effective; if this orientation cannot be assured, the square edge Pruyn Point 75500 will be best as its strong corners will dig into the rock and support the pile. For these cases, special care in welding the point to the pile is indicated.

Soldier piles and pulled piles, driven under a wide variety of field conditions —with and without Pruyn Points—almost invariably show that piles with point protection suffer much less damage than piles driven under the same conditions without points. Soldier piles exposed for their entire length are especially interesting in comparing resistance to damage. Boulders and different strata can be seen, at least temporarily until the lagging is placed, so that actual driving conditions can be studied. It is most interesting when the tip of the pile is fully exposed "in-situ."

Pulled piles show what happens to a few selected pieces. Ordinarily only carefully driven test piles or suspected piles are pulled so they may be less representative of conditions than soldier piles. But they are driven into different strata for a different purpose so both add to knowledge, especially if shared through publication. APF personnel try to see piles exposed to learn how they react under varying conditions. Knowledge gained is used to improve accessories for piling.

On the subject of H-piles, there is an efficient splicer available. It is shop fabricated to fit each web thickness at close tolerance with a heavily welded spacer. In the field, a notch is cut in the end of one section of H, the splicer is slipped on the pile and a short weld made near each corner. The splicer is mated with the other pile section and welds made at the other corners.

A weld is made along each flange, where the flanges of the upper length of pile had been beveled to assure good penetration. The APF Champion Splicer provides for an easy, safe and firm connection that will hold a moderate length addition so welding can be done when convenient.

Pipe piles

D. T. Hughes of Southern Pacific Transportation Co. made an excellent presentation on pipe piles before this group in 1971. I am privileged to use some of the slides he assembled. Conical points are generally preferred for pipe piles; they penetrate rather than just beat the earth as flat-plate-closure does. This preserves the friction better. Where obstructions or uneven bearing is encountered, the conical point distributes the load around the full periphery of the pipe rather than taking the load on one quadrant and perhaps crimping the pile wall.

A 60-deg. angle for the conical point seems to be best for pipe pile installations. The flatter 90-deg. points may have problems in hard driving for the larger sizes of pipe. The 60-deg. point is longer and requires a little more metal but experience shows it to be desirable.

Open-end pipe driven to rock, cleaned out and reseated into the rock then filled with concrete is allowed very heavy loading under most codes. With a cast-steel cutting shoe, designed for the pipe to bear on a ledge rather than be held by welds in shear, the open-end pipe pile can be used to penetrate almost any material to reach bearing strata.

Where pipe piles are long the Advance Splicer provides for added lengths without welding. The splicer has the inside tapered; the two ends of pipe are swaged into it to make a connection that is adequate for lateral forces and for most uplift conditions.

For piles free-standing in water or to resist full uplife, the splicer is available without the taper so it can be slipped on the lower section of pile and welded without forcing sections together with the hammer. Driving can then be done on the splicer sleeve; the next length is set into the sleeve and the joint completed with a simple down-hand weld. This is especially helpful where headroom conditions permit adding only short lengths to make long piles.

Pipe piles generally are concrete filled. Additionally there are other types of concrete piles. Some new mandrels —and high prices for pipe—have given an impetus to greater use of corrugated shell casing. These are installed with an expandable internal mandrel; shell may be of uniform diameter for full depth or tapered.

Augered caissons may be just an augered hole in the ground filled with concrete in soil that will stand open. Sometimes the hole is cased or drilling mud is used to prevent sloughing of the soil. Another means of placement is to force grout down an open center in the auger. An augered shaft may be enlarged at the bottom to reduce the unit bearing stress on the soil. Any uncased pile requires exceptional vigilance and knowledge to prevent intrusion of material into the shaft. Separation of the concrete column may occur with cased or uncased piles.

Cast-in-place piles

Perhaps more adaptable to bridge work than the cast-in-place piles described above are precast piles, which may be prestressed. They install and function somewhat like a timber pile. They are a displacement type and require care to avoid damage in driving. The tip end sometimes breaks up in driving; splicing or cutting off excessive length can be expensive. Under some conditions of soils and hammer energy

the precast pile is especially susceptible to damage from a compression wave followed by a tension wave generated in driving. There are economies that make the precast pile worth considering for many jobs.

The large cylinder piles, usually precast in moderate lengths with 4- to 5-in. walls, are post-tensioned by wires placed through openings formed in the walls. They can be an excellent choice where long lengths are needed in water where high-capacity floating equipment can be used for installtaion.

Timber piles still have a big place in construction, sometimes for temporary work. Frequently there is a need to penetrate obstructions along a stream bed. Tip reinforcement can help to assure that the pile is installed full depth in good condition. The conventional pointed tip must take any end bearing on a very small area.

A boot, which protects the end of the full pile without cutting it down to a point, is gaining favor. Engineers like the larger bearing. Constructors can have different sizes on hand and use the one that fits without the problem of shaping the pile end.

Transition sections are available to make a composite pile of untreated timber to shell to be filled with concrete. Transition can also be made from pipe to shell for long lengths, hard driving or just economy.

Sheet piling will occasionally be a big problem for some of you. It may be a bridge-pier cofferdam in a boulder-filled stream bed or a water terminal structure. Burlington-Northern, for example, has a large development at Duluth-Superior. Driving shoes are available for protection; for Z-sections they can be purchased in one piece to unify the full end of the pile. An unusual application was to put APF's Protector shoe on a sheet pile and use it to cut down through an existing sheet pile wall that had to be intersected at a right angle. The new wall cut through the old 3 8-in.-thick sheets to a depth of 30 ft. without driving out of interlock.

Investigate soils ahead of design

Borings in advance of design are essential for even a few piles at a crossing of a small stream. At least one boring should be carried 50 ft. below the top of what appears to be adequate bearing strata or 10 ft. into rock. The designer can then be reasonably sure what the subsurface condition is. But in water-soluble limestones and some other materials extensive investigation and conservative design are indicated. For buildings, especially structures on a waterfront, it may be desirable to follow the New York City Code, which requires a boring for each 2,500 sq. ft. of buildings area. For large areas this may be increased to 5,000 sq. ft. with one boring in every 10,000 sq. ft. carried to 100 ft. below the curb level. There are other good ideas for borings and pile installation in the New York City Code. A committee of eminent engineers and constructors wrote the code but invitably there were compromises.

Test piles are desirable in advance of design and construction to see exactly how piles may react in advance of being fully locked into a particular design. But for small bridges with moderate loads this may not be practical. It may be more economical to use a conservative design with H-piles or pipe. These can be easily spliced or excess length salvaged; design can be modified with a minimum loss of material or time.

Associated Pile & Fitting Corp., and many others, continually study the needs of pile foundations and try to develop materials and methods that will be helpful. Improved splicers and point protection for precast piles and better control of hammers are subjects

of current study. APF conducts seminars on design and installation of piling, keeping presentations in understandable terms with a minimum of theoretical jargon. Currently a Deep Foundations Institute is being organized to bring together planners, designers, contractors and the equipment and materials people.

APF compiles and mails to interested people a bimonthly "Piling and Foundation News" sheet, PILETIPS, at no charge. It will keep you abreast of activities, publications and meetings in the Deep Foundation field. Those of you who are interested are invited to ask that it be sent to you. APF will be pleased to have your request.

President Ridgeway: Thanks, Mr. Hunt.

The next presentation is also an illustrated address. This one is on "How We Rebuilt in Eight Days, Using Concrete and Steel Construction, the Burned-Out 1100-ft. Timber Trestle Approach to the Feather River Bridge." Our speaker needs no formal introduction, he is well known to all of us. He is T. (Tom) L. Fuller, engineer of bridges, S.P., San Francisco, and a Past President of the Association.

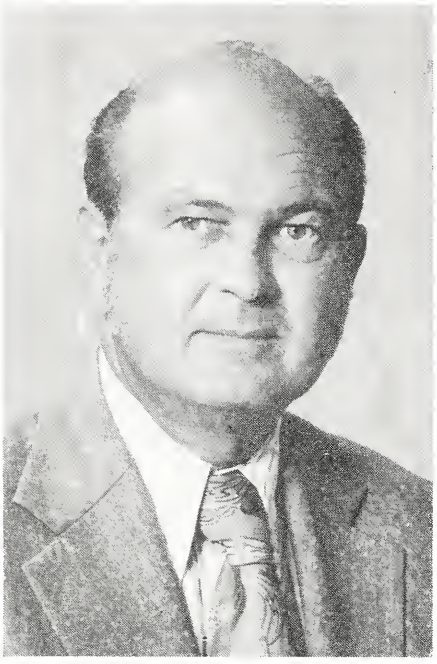
Rapid Reconstruction of S.P.'s Burned-Out Timber Trestle Approach

By T. L. FULLER

Engineer Bridges, Southern Pacific, San Francisco, Calif.

The main route of the Southern Pacific to Oregon and Northern California runs North from Roseville, Calif., in the Sacramento River valley then up the Sacramento River canyon, skirts the base of Mt. Shasta and into Oregon. This is a very important route and handled approximately 27 million tons of traffic in 1974. It is single track, with CTC. As the route roughly parallels the Sacramento River, it crosses the rivers tributaries that drain the western slopes of the Sierra Nevada mountains. One of these tributaries is the Feather River.

The Feather River bridge consisted of 495 ft. of ballast-deck trestle west approach, two 165-ft. steel through-trusses and 1485 ft. of ballast-deck trestle east approach. The east approach was divided into three segments by concrete piers with short steel spans which, in theory, would function as firebreaks. The trestle had a maximum height of 30 ft. at the steel truss. The trestle was built in 1910, and consisted of 7 pile bents, 14-in. by 14-in. by 16-ft. caps, twelve 8-in. by 18-ft. stringers, 3-in. deck planks and timber handrails. Bent spacing is 15 ft. O in. Slides (1) and (2) illustrate the east approach, which is partially on a 3°17′ curve. At approximately 1:30 p.m. on Thursday, Octo-



T. L. Fuller

ber 17, 1974, a westbound train passing over the bridge reported smoke coming from under the bridge.

Many fire units are called

The Feather River separates Marysville and Yuba City. Fire departments were called, aerial bombers were utilized (Slide 3) but fire was uncontrolable (Slide 4) and fanned by winds, soon spread for 1050 ft. of bridge (Slide 5). We shoved one of our fire cars onto the truss portion (Slide 6) to prohibit the fire from spreading across the trusses. It became obvious that we were going to lose most of the east approach, so we concentrated on protecting the steel spans and not allowing fire to jump the second fire break. The fire continued to burn (Slides 7, 8, 9, & 10) and we commenced removal of the damaged bridge where possible (Slides 11, 12, 13 and 14). By morning of Friday, October 18, the bridge had been collapsed, materials bulldozed into piles and cleaning-up operations well along.

Before describing the reconstruction work, a brief description of the S.P. standard prestressed-concrete bridge is in order. This bridge was developed to be the replacement for our timber trestles with standardized components (Slide 15). The deck units are 29 ft. 10½ in. long, 6 ft. 8 in. wide by 2 ft. 6 in. thick hollow double-box units, having a full-length shear key on one side and a combination ballast curb—sidewalk on the other side. Two such units are epoxied together to form a span. Each unit is prestressed with forty-four ½-in. 270 KSI strands.

The cap is 2 ft. 8 in. wide by 2 ft. 8 in. deep by 14 ft. 10 in. long and is conventionally reinforced. Anchored into the bottom of the cap is a weathering steel plate 22 in wide by 12 ft. 4 in. long by ½ in. thick, which is utilized for connecting the piling. In the top of the cap are two steel plate inserts utilized for welding transverse and longitudinal anchorages and earthquake tie-down assemblies. The piling can be either steel-pipe shells or bearing piles, depending on the soil and water conditions. All connections of slab-to-cap, cap-to-piles, bracing of piling and attachment of handrail posts is done by welding.

In this slide you can see most of the components described, in addition you will notice a longitudinal strip of polyurethane foam which has been glued to the side of the slab at the bottom of the shear key. This foam strip will be compressed when the next deck unit is placed as tightly as possible, thereby making a seal to retain the epoxy which is later poured into the shear key.

Rob other projects for materials

Decision was made Thursday night to reconstruct the east approach using off-track pile-driving equipment, with

S.P. furnishing all materials. Because our bridge is standardized, we could take the materials from other bridge reconstruction projects and utilize them at the Feather River, as well as various materials in casting yards awaiting shipment.

We obtain most of our concrete bridge components from Victoria, Texas, or Phoenix, Arizona; and by the morning of Friday, October 18, we had obtained a count of components on hand in these two plants. These were instructed to be loaded and shipped.

The balance of materials came from projects already under way, which we halted. We stopped projects in Sabinal, Texas; Eureka, Cal.; Los Angeles; Fernley, Nev.; Coos Bay, Oregon, for their deck slabs and caps. We took caps from Albany, Oregon, also. A project 75 miles away had 200 pieces of 14-in. — 73-lb. weathering-steel bearing piling, and we had a stcokpile of these piling at Eugene, Oregon. By completely stripping those bridge projects and cleaning out the two casting yards we managed to get all the materials required. Smaller items, such as epoxy, handrail materials, bent bracing materials, etc., were purchased in the San Francisco-Sacramento area and trucked directly to job site.

Friday, October 18, was spent at the site cleaning up, making an open area for working and staking out the new bent locations. In my office, Friday was spent getting materials located, instructions to the various bridge projects to shut down and load up their materials and arranging for additional B&B men, particularly qualified welders, from our other division. We were also loading the 200 pieces of piling nearby and at Eugene. The contractor had arranged for pile-driving equipment and crews, which meant shutting down other jobs, loading and moving.

Start driving on Saturday

Saturday morning, October 19, the two off-track pile drivers arrived and commenced setting up. The site had been cleared, bents staked and piling were being distributed from the truss span (West) end (Slide 16). The first pile driver began driving about 1 p.m., utilizing a P&H truck crane with 60-ft. leads, hydraulic pile spotter and Mitsubishi M-23 single-acting diesel hammer having an output of 45,000 ft.-lbs. per blow, (Slide 17). The second pile driver, a Bucyrus crawler crane also with 60-ft. leads, hydraulic spotters and Mitsubishi M-23 hammer commenced driving around 3 p.m. (Slide 18) illustrates the project as pile driving began.

We anticipated that approximately 60 ft. penetration into the ground would be required to develop the 100-ton resistance required. As the piling were 40 ft. long, a splice was required. The contractor would drive a 40-ft. piece, stopping about 5 ft. above the ground and meanwhile would be scarfing the flanges of another 40-ft. piece and welding alignment plates to the web. This section would then be set onto the driven piece, aligned and a welded splice made. Driving would then resume until the required blow count of 8 blows per inch was obtained. The contractor would then move to another pile and continue until all 4 piles in a bent were driven.

SP forces would then complete the bent, which usually involved welding another extension onto the driven portion, aligning piles and cutting-off to receive the cap (Slide 19). Caps and slabs were brought to the east end of the bridge by work train, unloaded onto trucks and driven to the installation site. The caps were set utilizing a truck crane (Slide 20) and welded by SP welders. In this slide, you will notice the neoprene bearing pads glued to the

top of the cap. After the cap was welded, sway and sash bracing was installed.

Work all night

Pile driving went on around the clock, commencing Saturday night, through the afternoon of Tuesday, Oct. 22, at which time all pile driving work was complete and the contract pile drivers began breaking down to move out. 36 bents of 4 piles each had been driven, averaging 65 ft. in the ground each. In other words, 144 piling had been driven (including 1 splice each) in 3 days (72 hours) for an average of 1 pile per hour per pile driver. We feel this was a remarkable production rate considering the batter of the piling, the splice welding, the time lost for moving from bent to bent, meal times, maintenance of equipment, etc. Slides 21, 22 and 23 illustrate various views of pile driving.

Meanwhile, cap installation was progressing by SP forces (Slide 24) and on the afternoon of Tuesday, Oct. 22, the first concrete deck units were installed (Slide 25). A precast-concrete block was installed on the top of the pier and anchored down to bring the deck unit to proper grade; which can be seen in this slide. Concrete deck installation continued until darkness. Work on bents (extending, aligning, cutting-off, capping and bracing) continued around the clock, but we did not unload, transport and install the deck slabs in darkness.

On Wednesday, Oct. 23, we commenced installing epoxy in the shear key to join the deck units together. As previously mentioned, the bottom and ends of the shear keys are sealed by a polyurethane foam strip which compressed when the deck slab is installed. The face of the shear key is sand-blasted in the casting yard prior to shipment, so decks are ready for epoxy as soon as they are set in place. The shear key is filled with crushed stone in order to reduce the volume of the epoxy (in bags on Slide 26), and epoxy poured into the shear key until full.

The track is panelized in 39-ft. lengths delivered to the site by truck from the assembly point, lifted by a locomotive crane and placed on the bridge (Slides 27 and 28) and crane moved ahead. When sufficient track panels were in place, a work train would bring ballast, dump and track lined and surfaced (Slide 29).

By 8 a.m. Thursday, Oct. 24, 390 ft. of track had been installed and ballasted. 14 bents were not completed (22 were complete), of which 8 were ready to receive the caps and 6 yet to be cut-off. By 1 p.m., only 2 bents were incomplete and 780 ft. of bridge had been installed (Slides 30, 31 & 32). Slab installation continued this night, and the last deck slab was installed at 1:18 a.m., Friday, Oct. 25. Five track panels remained to be installed and 400 ft. to be ballasted.

Restored to service Friday

By noon, Friday, Oct. 25, work was complete (Slide 33 & 34) and the first train (Slides 35, 36 & 37) passed over bridge. Later, hand railings were installed and jointed rail replaced with continuous welded rail.

This was almost exactly 8 days since the fire was discovered. In those 8 days, we had to clean up the debris, make working space, locate and move to site approximately 300 pieces of steel piling, 36 caps, 72 deck slabs (some had to move as far as 2200 miles), gallons of epoxy, several tons of bracing materials, contract pile drivers, welders and welding machines, several bulldozers, locomotive crane and assorted trucks, hi-rangers, etc., and build 1080 ft. of bridge. We were fortunate that

the weather was good and no major breakdowns occurred.

Work at the site was under the control of C. J. Westerman, B&B supervisor, Sacramento Division and G. R. Taylor, general B&B supervisor of my staff, both of whom are members of this Association. We feel that this project is one in which we can take pride in the accomplishment of so much work in such a short period of time.

Thank you.

President Ridgeway: Thank you, Tom.

The Nominating Committee which is composed of the five most recent presidents, has been busy picking a slate of candidates to serve our Association for the coming year. The names to be presented are a nomination only of the Nominating Committee and other names may be nominated from the floor. Mr. E. E. Runde, as the immediate Past President, will please come forward and make his report.

At this time, this being my last official account as your President, I wish to thank each member, each officer, for the truly whole-hearted support which was given me this past year, while I served as your President. Without this support it would have been an impossible task to guide the affairs of the Association. I truly appreciate all the help and kindness you have showed me. As I now become the immediate Past President, I ask and know that you will give your continued support to the new incoming President. Mr. Runde will you please conduct the election?

Report of Nominating Committee

Past President Runde: Thank you Mr. Ridgeway. During the past year the Nominating Committee selected the following candidates to be presented to you today as the nominees for Directors of the Association for the three-year term beginning at the close of today's meeting:

W. J. Gunkle, supervisor of structures, Penn-Central Transportation Co., Cincinnati, Ohio.

W. E. Halley, manager of fire prevention, Chicago & North Western Railway, Chicago.

K. L. Wammel, assistant division engineer, Southern Pacific Transportation Co., Portland, Oregon.

The Nominating Committee also selected the following candidates as nominees for Officers of the Association for the one-year term beginning at the close of today's meeting:

For Secretary—Mrs. Ann Wilson, 18154 Harwood Avenue, Homewood, Ill.

For Treasurer—W. H. Huffman, assistant vice president and chief engineer (retired), Chicago & North Western Railway, Wilmette, Ill.

For Third Vice President—J. R. Iwinski, assistance chief engineer-structures, Chicago & North Western, Chicago.

For Second Vice President—J. C. Hobbs, assistant chief engineer, Richmond, Fredericksburg & Potomac, Richmond, Va.

For First Vice President—W. H. Rankin, senior structural engineer, St. Louis-San Francisco Railway, Springfield, Mo.

For President—J. R. Williams, engineer of bridges, Chicago, Rock Island & Pacific Railway, Chicago.

Other candidates for these offices may be nominated from the floor at this time. Do I hear any such nominations? (Silence).

There being no other nominees for these offices, I will accept a motion that the above-named candidates be elected to serve as the Officers and Directors of the American Railway Bridge & Building Association for the term of office as stated.

(Motion was made and seconded and the election was adopted by unanimous vote of those present.)

Mr. Williams, as newly elected President of our Association will you please come forward and instruct the new Officers and Directors in their duties for the coming year?

Past President Ridgeway: Just a moment. Mr. Williams, before you take over the meeting, there is just one more thing I would like to do. I would like to introduce Lou Martin from REMSA, who has asked to say a few words.

L. E. Martin: Mr. Ridgeway and members of the B&B Association:

It is a pleasure on behalf of REMSA to congratulate your Association on its new Officers and Directors.

We want to thank Mr. Ridgeway and the members of his Board for the fine cooperation we have received the past year. We feel certain that this will continue this coming year.

It has been customary for REMSA to present the incoming President with a gavel symbolic with his term of office. (Presents gavel). Mr. Williams, we know you will use it wisely.

President-Elect Williams: Thank you Mr. Martin.

Now, Mr. Ridgeway. John, in recognition of the time and expertise that you have given in carrying out the affairs of the Association over the last seven years, we now wish to present you with this certificate as a token of appreciation of all of the 687 members of the Association. (Presents plaque).

Past President Ridgeway: Thank you, Jack. This will be one of my treasured possessions.

President-Elect Williams: Is there any further new business?

If not, I declare the 80th annual convention adjourned.

Past Officers

	1891-1892	1892-1893	1893-1894	1894-1895
President	O. J. Travis	H. M. Hall	J. E. Wallace	Geo. W. Andrews
1st V.-Pres.	H. M. Hall	J. E. Wallace	Geo. W. Andrews	W. A. McGonagle
2nd V.-Pres.	J. B. Mitchell	G. W. Hinman	W. A. McGonagle	L. K. Spafford
3rd V.-Pres.	James Stannard	N. W. Thompson	L. K. Spafford	James Stannard
4th V.-Pres.	G. W. Hinman	C. T. Fuller	E. D. Hines	Walter G. Berg
Secretary	C. W. Gooch	S. F. Patterson	S. F Patterson	S. F. Patterson
Treasurer	George M. Reid	George M. Reid	George M. Reid	George M. Reid
Executive Members	W. R. Damon	G. W. Andrews	Q. McNab	James Stannard
	G. W. Markley	J. M. Staten	A. S. Markley	James H. Travis
	W. A. McGonagle	J. M. Caldwell	Floyd Ingram	J. H. Cummin
	C. W. McGehee	Q. McNab	James Stannard	R. M. Peck
	G. W. Turner	Floyd Ingram	James H. Travis	J. L. White
	J. E. Wallace	A. S. Markley	J. H. Cummin	A. Shane

	1895-1896	1896-1897	1897-1898	1898-1899
President	W. A. McGonagle	James Stannard	Walter G. Berg	J. M. Cummin
1st V.-Pres.	L. K. Spafford	Walter G. Berg	J. H. Cummin	A. S. Markley
2nd V.-Pres.	James Stannard	J. H. Cummin	A. S. Markley	C. C. Mallard
3rd V.-Pres.	Walter G. Berg	A. S. Markley	G. W. Hinman	W. A. Rogers
4th V.-Pres.	J. H. Cummin	R. M. Peck	C. C. Mallard	J. M. Staten
Secretary	S. F. Patterson	S. F. Patterson	S. F. Patterson	S. F. Patterson
Treasurer	George M. Reid	N. W. Thompson	N. W. Thompson	N. W. Thompson
Executive Members	R. M. Peck	W. O. Eggleston	G. J. Bishop	Wm. S. Danes
	L. J. White	W. M. Noon	C. P. Austin	J. H. Markley
	A. Shane	J. M. Staten	M. Riney	W. O. Eggleston
	A. S. Markley	G. J. Bishop	Wm. S. Danes	R. L. Heflin
	W. M. Noon	C. P. Austin	J. H. Markley	F. W. Tanner
	J. M. Staten	M. Riney	W. O. Eggleston	A. Zimmerman

	1899-1900	1900-1901	1901-1902	1902-1903
President	Aaron S. Markley	W. A. Rogers	W. S. Danes	B. F. Pickering
1st V.-Pres.	W. A. Rogers	W. S. Danes	B. F. Pickering	C. C. Mallard
2nd V.-Pres.	J. M. Staten	B. G. Pickering	A. Shane	A. Shane
3rd V.-Pres.	Wm. S. Danes	A. Shane	A. Zimmerman	A. Zimmerman
4th V.-Pres.	B. F. Pickering	A. Zimmerman	C. C. Mallard	A. Montzheimer
Secretary	S. F. Patterson	S. F. Patterson	S. F. Patterson	S. F. Patterson
Treasurer	N. W. Thompson	N. W. Thompson	N. W. Thompson	N. W. Thompson
Executive Members	T. M. Strain	T. M. Strain	A. Montzheimer	W. E. Smith
	R. L. Heflin	H. D. Cleaveland	W. E. Smith	A. W. Merrick
	F. W. Tanner	F. W. Turner	A. W. Merrick	C. P. Austin
	A. Zimmerman	A. Montzheimer	C. P. Austin	C. A. Lichty
	H. D. Cleaveland	W. E. Smith	C. A. Lichty	W. O. Eggleston
	A. Montzheimer	A. W. Merrick	W O. Eggleston	J. H. Markley

	1903-1904	1904-1905	1905-1906	1906-1907
President	A. Montzheimer	C. A. Lichty	J. B. Sheldon	J. H. Markley
1st V.-Pres.	A. Shane	J. B. Sheldon	J. H. Markley	R. H. Reid
2nd V.-Pres.	C. A. Lichty	J. H. Markley	R. H. Reid	J. P. Canty
3rd V.-Pres.	J. B. Sheldon	R. H. Reid	R. C. Sattley	H. Rettinghouse
4th V.-Pres.	J. H. Markley	R. C. Sattley	J. P. Canty	F. E. Schall
Secretary	S. F. Patterson	S. F. Patterson	S. F. Patterson	S. F. Patterson
Treasurer	C. P. Austin	C. P. Austin	C. P. Austin	C. P. Austin
Executive Members	R. H. Reid	W. O. Eggleston	H. Rettinghouse	W. O. Eggleston
	W. O. Eggleston	A. E. Killam	A. E. Killam	A. E. Killam
	A. E. Killam	H. Rettinghouse	J. S. Lemond	J. S. Lemond
	R. C. Sattley	J. S. Lemond	C. W. Richey	C. W. Richey
	H. Rettinghouse	W. H. Finley	W. O. Eggleston	H. H. Eggleston
	J. S. Lemond	C. W. Richey	F. E. Schall	B. J. Sweatt

	1907-1908	1908-1909	1909-1910	1910-1911
President	R. H. Reid	J. P. Canty	H. Rettinghouse	H. Rettinghouse
1st V.-Pres.	J. P. Canty	H. Rettinghouse	J. S. Lemond	F. E. Schall
2nd V.-Pres.	H. Rettinghouse	F. E. Schall	F. E. Schall	A. E. Killam
3rd V.-Pres.	F. E. Schall	J. S. Lemond	A. E. Killam	J. N. Penwell
4th V.-Pres.	W. O. Eggleston	A. E. Killam	J. N. Penwell	L. D. Hadwen
Secretary	S. F. Patterson	S. F. Patterson	C. A. Lichty	C. A. Lichty
Treasurer	C. P. Austin	C. P. Austin	J. P. Canty	J. P. Canty
Executive Members	A. E. Killam	J. N. Penwell	W. Beahan	T. J. Fullem
	J. S. Lemond	Willard Beahan	F. B. Scheetz	G. Aldrich
	C. W. Richey	F. B. Scheetz	L. D. Hadwen	P. Swenson
	T. S. Leake	W. H. Finley	T. J. Fullem	G. W. Rear
	W. H. Finley	L. D. Hadwen	G. Aldrich	W. O. Eggleston
	J. N. Penwell	T. J. Fullem	P. Swenson	W. F. Steffens

	1911-1912	1912-1913	1913-1914	1914-1915
President	F. E. Schall	A. E. Killam	J. N. Penwell	L. D. Hadwen
1st V.-Pres.	A. E. Killam	J. N. Penwell	L. D. Hadwen	G. Aldrich
2nd V.-Pres.	J. N. Penwell	L. D. Hadwen	G. Aldrich	G. W. Rear
3rd V.-Pres.	L. D. Hadwen	T. J. Fullem	G. W. Rear	C. E. Smith
4th V.-Pres.	T. J. Fullen	G. Aldrich	C. E. Smith	E. B. Ashby
Secretary	C. A. Lichty	C. A. Lichty	C. A. Lichty	C. A. Lichty
Treasurer	J. P. Canty	J. P. Canty	J. P. Canty	F. E. Weise
Executive Members	G. Aldrich	G. W. Rear	W. F. Steffens	W. F. Steffens
	P. Swenson	W. F. Steffens	E. B. Ashby	S. C. Tanner
	G. W. Rear	E. B. Ashby	S. C. Tanner	Lee Jutton
	W. F. Steffens	C. E. Smith	Lee Jutton	F. F. Strouse
	E. B. Ashby	S. C. Tanner	W. F. Strouse	C. R. Knowles
	W. O. Eggleston	Lee Jutton	C. R. Knowles	A. Ridgway

	1915-1916	1916-1917	1917-1918	1918-1919
President	G. W. Rear	C. E. Smith	S. C. Tanner	Lee Jutton
1st V.-Pres.	C. E. Smith	E. B. Ashby	Lee Jutton	F. E. Weise
2nd V.-Pres.	E. B. Ashby	S. C. Tanner	F. E. Weise	W. F. Strouse
3rd V.-Pres.	S. C. Tanner	Lee Jutton	W. F. Strouse	C. R. Knowles
4th V.-Pres.	Lee Jutton	F. E. Weise	C. R. Knowles	A. Ridgway
Sec.-Treas.	C. A. Lichty	C. A. Lichty	C. A. Lichty	C. A. Lichty
Executive Members	F. E. Weise	W. F. Strouse	A. Ridgway	J. S. Robinson
	W. F. Strouse	C. R. Knowles	J. S. Robinson	J. P. Wood
	C. R. Knowles	A. Ridgway	J. P. Wood	A. B. McVay
	A. Ridgway	J. S. Robinson	D. C. Zook	J. H. Johnston
	J. S. Robinson	J. P. Wood	A. B. McVay	E. T. Howson
	J. P. Wood	D. C. Zook	J. H. Johnston	C. W. Wright

	1919-1920	1920-1921	1921-1922	1922-1923
President	F. E. Weise	W. F. Strouse	C. R. Knowles	Arthur Ridgway
1st V.-Pres.	W. F. Strouse	C. R. Knowles	A. Ridgway	J. P. Wood
2nd V.-Pres.	C. R. Knowles	A. Ridgway	J. S. Robinson	J. S. Robinson
3rd V.-Pres.	A. Ridgway	J. S. Robinson	J. P. Wood	C. W. Wright
4th V.-Pres.	J. S. Robinson	J. P. Wood	C. W. Wright	E. T. Howson
Sec.-Treas.	C. A. Lichty	C. A. Lichty	C. A. Lichty	C. A. Lichty
Asst. Sec.			F. E. Weise	F. E. Weise
Directors	J. P. Wood	C. W. Wright	E. T. Howson	F. C. Baluss
	A. B. McVay	A. B. McVay	J. H. Johnston	Maro Johnson
	J. H. Johnston	G. A. Manthey	E. K. Barrett	O. F. Dalstrom
	E. T. Howson	E. T. Howson	F. C. Baluss	S. D. Corey
	C. W. Wright	J. H. Johnston	Maro Johnson	W. B. Hotson
	G. A. Manthey	E. K. Barrett	O. F. Dalstrom	P. N. Nelson

	1923-1924	1924-1925	1925-1926	1926-1927
President	J. S. Robinson	J. P. Wood	C. W. Wright	E. T. Howson
1st V.-Pres.	J. P. Wood	C. W. Wright	E. T. Howson	F. C. Baluss
2nd V.-Pres.	C. W. Wright	E. T. Howson	F. C. Baluss	Maro Johnson
3rd V.-Pres.	E. T. Howson	F. C. Baluss	Maro Johnson	J. S. Huntoon
4th V.-Pres.	F. C. Baluss	Maro Johnson	J. S. Huntoon	C. S. Heritage
Sec.-Treas.	C. A. Lichty	C. A. Lichty	C. A. Lichty	C. A. Lichty
Asst. Sec.	F. E. Weise	F. E. Weise	F. E. Weise	F. E. Weise
Directors	S. T. Corey	J. S. Huntoon	C. S. Heritage	A. I. Gauthier
	W. B. Hotson	A. I. Gauthier	W. B. Hotson	E. L. Sinclair
	P. N. Nelson	E. L. Sinclair	P. N. Nelson	P. F. Dalstrom
	J. S. Huntoon	C. S. Heritage	A. I. Gauthier	W. T. Krausch
	A. I. Gauthier	W. B. Hotson	E. L. Sinclair	R. C. Bardwell
	E. L. Sinclair	P. N. Nelson	O. F. Dalstrom	H. I. Benjamin

	1927-1928	1928-1929	1929-1930	1930-1934
President	F. C. Baluss	Maro Johnson	J. S. Huntoon	C. S. Heritage
1st V.-Pres.	Maro Johnson	J. S. Huntoon	C. S. Heritage	A. I. Gauthier
2nd V.-Pres.	J. S. Huntoon	C. S. Heritage	A. I. Gauthier	H. I. Benjamin
3rd V.-Pres.	C. S. Heritage	A. I. Gauthier	H. I. Benjamin	W. T. Krausch
4th V.-Pres.	A. I. Gauthier	H. I. Benjamin	W. T. Krausch	T. H. Strate
Sec.-Treas.	C. A. Lichty	C. A. Lichty	C. A. Lichty	C. A. Lichty
Asst. Sec.	F. E. Weise	F. E. Weise		
Directors	W. T. Krausch	R. C. Henderson	G. A. Rodman	E. C. Neville
	R. C. Bardwell	J. S. Ekey	W. A. Batey	H. H. Best
	H. I. Benjamin	T. H. Strate	F. W. Hillman	J. E. King
	R. C. Henderson	G. A. Rodman	E. C. Neville	A. B. Scowden
	T. H. Strate	W. A. Batey	H. H. Best	W. A. Batey
	J. S. Ekey	F. W. Hillman	J. E. King	L. C. Smith

	1934-1935	1935-1936	1936-1937	1937-1938
President	H. I. Benjamin	T. H. Strate	E. C. Neville	C. M. Burpee
1st V.-Pres.	T. H. Strate	E. C. Neville	C. M. Burpee	F. H. Masters
2nd V.-Pres.	E. C. Neville	C. M. Burpee	F. H. Masters	W. S. Lacher
3rd V.-Pres.	A. B. Scowden	F. H. Masters	C. A. J. Richards	C. A. J. Richards
4th V.-Pres.	W. R. Roof	C. A. J. Richards	W. S. Lacher	F. H. Cramer
Sec.-Treas.	C. A. Lichty	C. A. Lichty	C. A. Lichty	C. A. Lichty
Directors	C. M. Burpee	A. L. McCloy	W. R. Roof	B. R. Meyers
	W. A. Batey	R. P. Luck	T. P. Soule	C. S. Crites
	L. C. Smith	H. H. Best	F. H. Cramer	R. E. Dove
	C. A. J. Richards	W. R. Roof	B. R. Meyers	T. P. Soule
	A. L. McCoy	T. P. Soule	G. S. Crites	A. Chinn
	R. P. Luck	F. H. Cramer	R. E. Dove	L. G. Byrd

	1938-1939	1939-1940	1940-1941	1941-1942
President	Armstrong Chinn	A. E. Bechtelheimer	H. M. Church	R. E. Dove
1st V.-Pres.	F. H. Cramer	F. H. Cramer	R. E. Dove	F. H. Soothill
2nd V.-Pres.	A. E. Bechtelheimer	H. M. Church	F. A. Soothill	G. S. Crites
3rd V.-Pres.	H. M. Church	R. E. Dove	G. S. Crites	A. M. Knowles
4th V.-Pres.	R. E. Dove	F. H. Soothill	A. M. Knowles	N. D. Howard
Sec.-Treas.	C. A. Lichty	C. A. Lichty		
Secretary	.....	.....	F. O. Whiteman	A. G. Shaver
Treasurer	.....	.....	F. E. Weise	F. E. Weise
Directors	L. G. Byrd	B. R. Meyers	N. D. Howard	R. E. Caudle
	W. R. Ganser	W. Walkden	L. G. Byrd	I. A. Moore
	F. H. Soothill	A. S. Krefting	K. L. Miner	W. A. Sweet
	B. R. Meyers	A. M. Knowles	R. E. Caudle	J. L. Varker
	W. Walkden	L. G. Byrd	I. A. Moore	L. E. Peyser
	A. S. Krefting	K. L. Miner	W. A. Sweet	Martin Meyer

	1942-1943	1943-1944	1944-1945	1945-1946
President	G. S. Crites	J. L. Varker	J. L. Varker	N. D. Howard
1st V.-Pres.	R. E. Caudle	R. E. Caudle	R. E. Caudle	F. G. Campbell
2nd V.-Pres.	A. M. Knowles	N. D. Howard	N. D. Howard	J. S. Hancock
3rd V.-Pres.	N. D. Howard	F. G. Campbell	F. G. Campbell	E. H. Barnhart
4th V.-Pres.	J. L. Varker	J. S. Hancock	J. S. Hancock	W. F. Martens
Secretary	A. G. Shaver†	Elinor V. Heffern	Elise LaChance	Elise LaChance
	Lorene Kindred‡			
	Elinor V. Heffern			
Treasurer	F. E. Weise	C. R. Knowles	C. R. Knowles	C. R. Knowles
Treasurer Emeritus		F. E. Weise	F. E. Weise	
Directors	M. Meyer	W. F. Martens	W. F. Martens	A. B. Chapman
	L. E. Peyser	A. L. McCloy	A. L. McCloy	W. A. Huckstep
	K. L. Miner	L. C. Winkelhaus	L. C. Winkelhaus	F. R. Spofford
	F. G. Campbell	E. H. Barnhart	E. H. Barnhart	Guy E. Martin
	J. S. Hancock	A. B. Chapman	A. B. Chapman	B. R. Meyers
	L. C. Winkelhaus	L. E. Peyser	L. E. Peyser	L. E. Peyser

† To November 1, 1952 ‡ To February 1, 1943

	1946-1947	1947-1948	1948-1949	1949-1950
President	F. G. Campbell	J. S. Hancock	E. H. Barnhart	W. F. Martens
1st V.-Pres.	J. S. Hancock	E. H. Barnhart	W. F. Martens	W. A. Huckstep
2nd V.-Pres.	E. H. Barnhart	W. F. Martens	W. A. Huckstep	Guy E. Martin
3rd V.-Pres.	W. F. Martens	W. A. Huckstep	Guy E. Martin	F. R. Spofford
4th V.-Pres.	W. A. Huckstep	G. E. Martin	F. R. Spofford	Lee Mayfield
Treasurer	Elise LaChance	Elise LaChance	Elise LaChance	Elise LaChance
Treasurer	C. R. Knowles	C. R. Knowles	L. C. Winkelhaus	L. C. Winkelhaus
Directors	Guy E. Martin	H. M. Harlow	Lee Mayfield	H. M. Harlow
	B. R. Meyers	H. B. Christianson	F. M. Misch	V. E. Engman
	L. E. Peyser	F. R. Spofford	W. D. Gibson	G. W. Benson
	H. M. Harlow	Lee Mayfield	H. M. Harlow	F. M. Misch
	H. B. Christianson	Franz M. Misch	V. E. Engman	L. R. Morgan
	F. R. Spofford	W. D. Gibson	G. W. Benson	J. A. Jorlett

	1950-1951	1951-1952	1952-1953	1953-1954
President	W. A. Huckstep	Guy E. Martin	F. R. Spofford	Lee Mayfield
1st V.-Pres.	Guy E. Martin	F. R. Spofford	Lee Mayfield	H. M. Harlow
2nd V.-Pres.	F. R. Spofford	Lee Mayfield	H. M. Harlow	J. A. Jorlett
3rd V.-Pres.	Lee Mayfield	H. M. Harlow	J. A. Jorlett	R. R. Gunderson
4th V.-Pres.	H. M. Harlow	J. A. Jorlett	R. R. Gunderson	W. H. Huffman
Secretary	Elise LaChance	Elise LaChance	Elise LaChance	Elise LaChance
Treasurer	L. C. Winkelhaus	L. C. Winkelhaus	L. C. Winkelhaus	L. C. Winkelhaus
Directors	F. M. Misch	M. H. Dick	W. H. Huffman	M. H. Dick
	L. R. Morgan	R. R. Gunderson	L. R. Morgan	J. F. Warrenfells
	J. A. Jorlett	J. F. Warrenfells	B. M. Stephens	G. Switzer
	M. H. Dick	W. H. Huffman	M. H. Dick	B. M. Stephens
	R. R. Gunderson	L. R. Morgan	J. F. Warrenfells	W. H. Bunge
	J. F. Warrenfells	B. M. Stephens	G. Switzer	E. R. Schlaf

	1954-1955	1955-1956	1956-1957	1957-1958
President	H. M. Harlow	J. A. Jorlett	R. R. Gunderson	W. H. Huffman
1st V.-Pres.	J. A. Jorlett	R. R. Gunderson	W. H. Huffman	M. H. Dick
2nd V.-Pres.	R. R. Gunderson	W. H. Huffman	M. H. Dick	B. M. Stephens
3rd V.-Pres.	W. H. Huffman	M. H. Dick	B. M. Stephens	H. D. Curie
4th V.-Pres.	M. H. Dick	B. M. Stephens	H. D. Curie	
Secretary	Elise LaChance	Elise LaChance	Elise LaChance	Elise LaChance
Treasurer	L. C. Winkelhause	L. C. Winkelhaus	L. C. Winkelhaus	L. C. Winkelhaus
Directors	B. M. Stephens	J. F. Warrenfells	W. H. Bunge	G. W. Benson
	W. H. Bunge	H. D. Curie	E. R. Schlaf	J. M. Lowry
	E. R. Schlaf	J. M. Lowry	G. W. Benson	H. H. Matthews
	J. F. Warrenfells	W. H. Bunge	J. M. Lowry	T. M. von Sprecken
	H. D. Curie	E. R. Schlaf	T. M. von Sprecken	W. H. Bunge
	J. M Lowry	G. W. Benson	H. A. Matthews	E. R. Schlaf

	1958-1959	1959-1960	1960-1961	1961-1962
President	M. H. Dick	B. M. Stephens	H. D. Curie	G. W. Benson
1st V.-Pres.	B. M. Stephens	H. D. Curie	G. W. Benson	J. M. Lowry
2nd V.-Pres.	H. D. Curie	G. W. Benson	J. M. Lowry	E. R. Schlaf
3rd V.-Pres.	G. W. Benson	J. M. Lowry	E. R. Schlaf	H. A. Matthews
Secretary	Ruth Weggeberg	Ruth Weggeberg	Ruth Weggeberg	Ruth Weggeberg
Treasurer	L. C. Winkelhaus	L. C. Winkelhause	L. C. Winkelhaus	L. C. Winkelhause
Directors	J. M. Lowry	W. H. Bunge	H. A. Matthews	R. C. Baker
	R. C. Baker	E. R. Schlaf	M. J. Hubbard	R. H. Miller
	W. H. Bunge	H. A. Matthews	R. C. Baker	Shirley White
	E. R. Schlaf	M. J. Hubbard	R. H. Miller	H. M. Wilson
	H. A. Matthews	R. C. Baker	Shirley White	R. D. Hellweg
	M. J. Hubbard	R. H. Miller	H. M. Wilson	F. W. Hutcheson

	1962-1963	1963-1964	1964-1965	1965-1966
President	J. M. Lowry	E. R. Schlaf	R. C. Baker	H. M. Wilson
1st V.-Pres.	E. R. Schlaf	R. C. Baker	H. M. Wilson	R. D. Hellweg
2nd V.-Pres.	H. A. Matthews	Shirley White	R. D. Hellweg	J. W. DeValle
3rd V.-Pres.	R. C. Baker	H. M. Wilson	J. W. DeValle	W. F. Armstrong
Secretary	Ruth Weggeberg	Ruth Weggeberg	Ruth Weggeberg	Ruth Weggeberg
Treasurer	L. C. Winkelhaus	E. F. Snyder	E. F. Snyder	E. F. Snyder
Directors	Shirley White	R. D. Hellweg	W. F. Armstrong	J. A. Goforth
	H. M. Wilson	F. W. Hutcheson	J. S. Ellis	E. R. Simmons
	R. D. Hellweg	W. F. Armstrong	J. A. Goforth	N. D. Bryant
	F. W. Hutcheson	J. W. DeValle	E. R. Simmons	A. R. Dahlberg
	W. F. Armstrong	J. A. Goforth	N. D. Bryant	J. S. Ellis
	J. W. DeValle	E. R. Simmons	A. R. Dahlberg	T. L. Fuller

	1966-1967	1967-1968	1968-1969	1969-1970
President	R. D. Hellweg	J. W. DeValle	W. F. Armstrong	J. A. Goforth
1st V.-Pres.	J. W. DeValle	W. F. Armstrong	J. A. Goforth	A. R. Dahlberg
2nd V.-Pres.	W. F. Armstrong	J. A. Goforth	A. R. Dahlberg	T. L. Fuller
3rd V.-Pres.	J. A. Goforth	A. R. Dahlberg	T. L. Fulle	N. D. Bryant
Secretary	Ruth Weggeberg	Ruth Weggeberg	Ruth Weggeberg	Ruth Weggeberg
Treasurer	W. H. Huffman	W. H. Huffman	W. H. Huffman	W. H. Huffman
Directors	N. D. Bryant	J. S. Ellis	N. F. Lucas	W. H. Rankin
	A. R. Dahlberg	T. L. Fuller	W. L. Short	E. E. Runde
	H. F. Lucas	R. A. Youngblood	C. E. Wachter	T. A. Reynolds
	J. S. Ellis	H. F. Lucas	A. C. Jones	J. J. Ridgeway
	T. L. Fuller	W. L. Short	W. H. Rankin	J. R. Williams
	R. A. Youngblood	C. E. Wachter	E. E. Runde	J. W. Chambers
	V. D. Raessler	A. C. Jones	T. A. Reynolds	R. E. Frame
	W. L. Short	W. H. Rankin	J. J. Ridgeway	J. C. Hobbs
	C. E. Wachter	E. E. Runde	J. R. Williams	

	1970-1971	1971-1972	1972-1973	1973-1974
President	A. R. Dahlberg	T. L. Fuller	N. D. Bryant	E. E. Runde
1st V.-Pres.	T. L. Fuller	N. D. Bryant	E. E. Runde	J. J. Ridgeway
2nd V.-Pres.	N. D. Bryant	E. E. Runde	J. J. Ridgeway	J. R. Williams
3rd V.-Pres.	E. E. Runde	J. J. Ridgeway	J. R. Williams	W. R. Rankin
Secretary	Ann Wilson	Ann Wilson	Ann Wilson	Ann Wilson
Treasurer	W. H. Huffman	W. H. Huffman	W. H. Huffman	W. H. Huffman
Directors	T. A. Reynolds	J. W. Chambers	R. K. Corbett	D. C. Gould
	J. J. Ridgeway	R. E. Frame	J. R. Iwinski	W. S. Stokely
	J. R. Williams	J. C. Hobbs	J. S. Pritchett	W. C. Sturm
	J. W. Chambers	R. K. Corbett	D. C. Gould	J. W. Davidson
	R. E. Frame	J. R. Iwinsky	W. S. Stokeley	C. A. Hughes
	J. C. Hobbs	J. S. Pritchett	W. C. Sturm	W. R. Hyma
	R. K. Corbett	D. C. Gould	J. W. Davidson	O. C. Denz
	J. R. Iwinsky	W. S. Stokeley	C. A. Hughes	R. C. McMaster
	J. S. Pritchett	W. C. Sturm	W. R. Hyma	W. E. Brakenslek

	1974-1975
President	J. J. Ridgeway
1st V.-Pres.	J. R. Williams
2nd V.-Pres.	W. H. Rankin
3rd V.-Pres.	J. C. Hobbs
Secretary	Ann Wilson
Treasurer	W. H. Huffman
Directors	J. W. Davidson
	C. A. Hughes
	W. R. Hyma
	W. E. Brakensiek
	O. C. Denz
	R. C. McMasters
	F. B. Lindsay, Jr.
	M. Noyszewski
	Jim Payne

HISTORICAL INFORMATION

List of Annual Conventions

No.	Place of Meeting	Date	Membership
1	St. Louis, Mo.	Sept. 25, 1891	60
2	Cincinnati, Ohio	Oct. 18-19, 1892	112
3	Philadelphia, Pa.	Oct. 17-19, 1893	128
4	Kansas City, Mo.	Oct. 16-18, 1894	115
5	New Orleans, La.	Oct. 15-16, 1895	122
6	Chicago, Ill.	Oct. 20-22, 1896	140
7	Denver, Colo.	Oct. 19-21, 1897	127
8	Richmond, Va.	Oct. 18-19, 1898	148
9	Detroit, Mich.	Oct. 17-19, 1899	148
10	St. Louis, Mo.	Oct. 16-18, 1900	143
11	Atlanta, Ga.	Oct. 15-17, 1901	171
12	Minneapolis, Minn.	Oct. 21-23, 1902	195
13	Quebec, Canada	Oct. 20-22, 1903	223
14	Chicago, Ill.	Oct. 18-20, 1904	293
15	Pittsburgh, Pa.	Oct. 17-19, 1905	313
16	Boston, Mass	Oct. 16-18, 1906	340
17	Milwaukee, Wis.	Oct. 15-17, 1907	341
18	Washington, D. C.	Oct. 20-22, 1908	368
19	Jacksonville, Fla.	Oct. 19-21, 1909	393
20	Denver, Colo.	Oct. 18-20, 1910	428
21	St. Louis, Mo.	Oct. 17-19, 1911	499
22	Baltimore, Md.	Oct. 15-17, 1912	524
23	Montreal, Quebec	Oct. 21-23, 1913	570
24	Los Angeles, Cal.	Oct. 20-22, 1914	586
25	Detroit, Mich.	Oct. 19-21, 1915	665
26	New Orleans. La.	Oct. 17-19, 1916	710
27	Chicago, Ill.	Oct. 16-18, 1917	704
28	Chicago, Ill.	Oct. 15-17, 1918	716
29	Cleveland, Ohio	Oct. 21-23, 1919	776
30	Atlanta, Ga.	Oct. 26-28, 1920	840
31	New York, N. Y.	Oct. 18-20, 1921	850
32	Cincinnati, Ohio	Oct. 17-19, 1922	865
33	Seattle, Wash.	Oct. 16-18, 1923	846
34	Kansas City, Mo.	Oct. 21-23, 1924	837
35	Buffalo, N. Y.	Oct. 20-22, 1925	759
36	Richmond, Va.	Oct. 12-14, 1926	750
37	Minneapolis, Minn.	Oct. 18-20, 1927	754
38	Boston, Mass.	Oct. 23-25, 1928	755
39	New Orleans, La.	Oct. 15-17, 1929	755
40	Louisville, Ky.	Oct. 21-23, 1930	713
41	Chicago, Ill.	Oct. 16-18, 1934	592
42	Chicago, Ill.	Oct. 15-17, 1935	547
43	Chicago, Ill.	Oct. 20-22, 1936	588
44	Chicago, Ill.	Oct. 19-21, 1937	566
45	Chicago, Ill.	Oct. 18-20, 1938	589
46	Chicago, Ill.	Oct. 17-19, 1939	546
47	Chicago, Ill.	Oct. 15-17, 1940	610
48	Chicago, Ill.	Oct. 14-16, 1941	594
49	Chicago, Ill.	Oct. 20-22, 1942	618
50	Chicago, Ill.	Oct. 20-21, 1943	597

No.	Place of Meeting	Date	Membership
51	Chicago, Ill.	Sept. 17-19, 1946	698
52	Chicago, Ill.	Sept. 16-18, 1947	651
53	Chicago, Ill.	Sept. 20-22, 1948	652
54	Chicago, Ill.	Sept. 12-14, 1949	676
55	Chicago, Ill.	Sept. 18-20, 1950	713
56	Chicago, Ill.	Sept. 17-19, 1951	676
57	Chicago, Ill.	Sept. 15-17, 1952	667
58	Chicago, Ill.	Sept. 15-17, 1953	666
59	Chicago, Ill.	Sept. 13-15, 1954	682
60	Chicago, Ill.	Sept. 19-21, 1951	625
61	Chicago, Ill.	Sept. 18-20, 1956	657
62	Chicago, Ill.	Sept. 23-25, 1957	769
63	Chicago, Ill.	Sept. 15-17, 1958	828
64	Chicago, Ill.	Sept. 15-17, 1959	863
65	Chicago, Ill.	Sept. 19-21, 1960	932
66	Chicago, Ill.	Sept. 18-20, 1961	968
67	Chicago, Ill.	Sept. 10-12, 1962	942
68	Chicago, Ill.	Oct. 14-16, 1963	887
69	Chicago, Ill.	Sept. 14-16, 1964	860
70	Chicago, Ill.	Sept. 13-15, 1965	829
71	Chicago, Ill.	Sept. 26-28, 1966	800
72	Chicago, Ill.	Oct. 11-13, 1967	799
73	Chicago, Ill.	Sept. 9-11, 1968	825
74	Chicago, Ill.	Sept. 9-11, 1969	746
75	Chicago, Ill.	Sept. 28-30, 1970	709
76	Chicago, Ill.	Sept. 13-15, 1971	719
77	Chicago, Ill.	Sept. 18-20, 1972	706
78	Chicago, Ill.	Sept. 17-19, 1973	750
79	Chicago, Ill.	Oct. 1- 3, 1974	683
80	Chicago, Ill.	Sept. 15-17, 1975	672

CONSTITUTION

ARTICLE I.

NAME

Section 1. This association shall be known as the American Railway Bridge & Building Association.

ARTICLE II.

OBJECT

Section 1.** The object of this association shall be the advancement of knowledge pertaining to the design, construction and maintenance of railway bridges, buildings, water service facilities, and other structures, by investigation, reports and discussions.

Section 2. The association shall neither indorse nor recommend any particular devices, trade marks or materials, nor will it be responsible for any opinions expressed in papers, reports or discussion unless the same have received the endorsement of the association in regular session.

ARTICLE III.

MEMBERSHIP

Section 1. The membership of this association shall be divided into five classes, viz: Members, life members, associate, honorary and junior members.*

Section 2.** A member shall be a person in a position above rank of gang foreman in connection with roadway bridge, building and water service work, or in the employ of a public regulatory body, a professor of engineering in a college, an engineering editor, or a government or private timber expert. Any person desirous of becoming a member shall make application upon the form prescribed by the executive committee, setting forth his name, age, residence and practical experience. He shall furnish at least three references to whom he is personally known. Applicants may be voted into membership at any regular executive meeting or by letter ballot of the executive committee, a majority vote being necessary in either instance.

Section 3.** To be eligible for a life membership a member must have belonged to the association for at least 15†† years and in general must have retired from active railway service due to age or physical disability. He shall have all the privileges of active membership, except the holding of office, and shall not be required to pay annual dues. The transfer from membership to life membership shall be made in the same manner as the election of members, as prescribed in Section 2, of this Article.

Section 4. Associates shall be responsible persons who are not eligible as members, whose pursuits or attainments qualify them to co-operate with members in the study and development of improved practices in the construction and maintenance of bridges, buildings and water facilities. They shall have all the rights of members except of voting and holding office. They shall be elected in the manner prescribed for members, in Section 2 of this Article.

Section 5. Honorary members shall be chosen from persons who have attained acknowledged eminence in some branch of engineering or railway service. Their number shall be limited to ten. Honorary members shall be proposed by not less than six active members and shall be elected by the unanimous vote of the members present at a regular meeting. They shall have all the rights of active members except that of holding office and shall be exempt from the payment of dues.

Section 6. A junior member shall be a person who is a graduate of a recognized engineering school, or who has been employed for at least two years in the design, maintenance or construction of railway bridges, buildings or structures. Applicants shall be at least 21 years of age and they shall be elected in the manner prescribed for members, in Section 2 of this article. Juniors shall have all the rights of members except that of holding office. When the attainments of a Junior are such as to qualify him as a member, he may apply for promotion and the executive committee shall authorize such promotion when qualifications warrant the action. Unless a Junior is promoted, his membership shall cease automatically when he becomes 28 years of age.*

* Amended October 16, 1941.
** Amended September 20, 1948
†† Amended March 10, 1958.

Section 7. Any member guilty of conduct unbecoming to a railroad officer and a member of this association, or who shall refuse to comply with the rules of this association, shall forfeit his membership on a two-thirds vote of the executive committee.

Section 8. Membership shall continue until written resignation is received by the secretary, unless member has been previously expelled, or dropped for non-payment of dues in accordance with Section 1 of Article VII.

Section 9.** Only active members shall hold office in this association, and only active and life members shall be entitled to vote in the election of officers.

ARTICLE IV.

OFFICERS

Section 1§. The officers of the Association shall be a president, three vice-presidents, a secretary, a treasurer and nine directors, who, with the most recent past president, shall constitute the Executive Committee.

Section 2. The past presidents of this association, previous to the most recent past president, who continue to be members shall be privileged to attend all meetings of the executive committee, at which meetings they shall receive due notice, and be permitted to discuss all questions and to aid said committee by their advice and counsel; but said past presidents shall not have a right to vote, unless called upon to fill a quorum.

Section 3. Vacancies in any office shall be filled for the unexpired term by the executive committee without delay.

ARTICLE V.

EXECUTIVE COMMITTEE

Section 1.** The executive committee shall manage the affairs of the association and shall have full power to control and regulate all matters not otherwise provided for in the constitution and by-laws and shall exercise general supervision over the financial interests of the association, and make all necessary purchases and contracts required to conduct the general business of the association, but shall not have the power to render the association liable for any debt beyond the amount then in the treasury plus accounts receivable and not subject to other prior liabilities. All appropriations for special purposes must be acted upon at a regular meeting of the association.

Section 2. Meetings of the executive committee may be called by a majority of the members of the committee, providing 10 days' notice is given members by mail.

Section 3. Five members of the executive committee shall constitute a quorum for the transaction of business.

ARTICLE VI.

ELECTION OF OFFICERS AND TENURE OF OFFICE

Section 1. Except as otherwise provided the officers shall be elected at the regular annual meeting of the association and the election shall not be postponed except by unanimous consent of the members present at said annual meeting. The election shall be by ballot, a majority of the votes cast being required for election. Any active member of the association not in arrears for dues shall be eligible for office, but the president shall not be eligible for re-election.

Section 2.§ The president, three vice-presidents, secretary and treasurer shall hold office for one year and the directors for three years, three directors being elected each year. All officers shall retain their office until their successors are elected and installed. A director elected for a three-year term shall not be eligible to serve two consecutive terms.

Section 3.† The term of office of the secretary and the treasurer may be terminated at any time by a two-thirds vote of the executive committee. Their compensation shall be fixed by a majority vote of the executive committee.

The secretary shall also serve as secretary of the executive committee.

Section. 4. The secretary and the treasurer shall be required to give bond in an amount to be fixed by the executive committee.

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* Amended October 16, 1941.
† Amended September 21, 1957.
§ Amended September 28, 1966.

ARTICLE VII.

MEMBERSHIP FEE AND DUES

Section 1.† Every member upon joining this association shall pay to the secretary an entrance fee and dues as prescribed by the executive committee. No member in arrears for annual dues shall be entitled to vote at any election and any member more than one year in arrears, may be stricken from the list of members at the discretion of the executive committee.

Section 2.‡ A person stricken from the list of members because of non-payment of dues, upon written application may be reinstated as a member in his former class without loss of privileges, either upon payment of all back dues (which must accompany applicants) or at the discretion of the executive committee voting in the manner prescribed in Section 2, Article III.

ARTICLE VIII.*

LOCAL SECTIONS

Section 1.** Upon the application of ten or more members of the association residing in the same geographical district, or having offices therein, the executive committee shall organize a local section for that district, to which all members in that district shall be eligible. Such local section shall admit to active membership only members in good standing. It shall hold not less than two meetings each year, and shall be governed by such constitution and by-laws not inconsistent with the constitution of this association as the section membership may adopt and the executive committee approve.

Section 2. The parent association shall not be put under any obligation, either financial or in the matter of policy or opinion, by any local section.

ARTICLE IX.

AMENDMENTS

Section 1. This constitution may be amended at any regular meeting by a two-thirds vote of the members present, provided that notice of the proposed amendment or amendments has been sent to the members at least 30 days previous to said regular meeting.

By-Laws

TIME OF MEETING

1.** The regular meeting of this association shall convene annually during the month of September, the exact date to be fixed by the executive committee.

PLACE OF MEETING

2.** The place of holding the annual convention shall be Chicago, Ill.

3. It shall be within the power of the executive committee to change the location or time of the meeting if it becomes apparent that it is for the best interests of the association.

QUORUM

4. At the regular meeting of the association, 15 or more members shall constitute a quorum.

***DUES

5. The annual dues for the fiscal year ending August 31, and payable in advance, shall be as follows:*

Members, $7.00; Associate Members, $7.00; Junior Members, $5.00.

DUTIES OF OFFICERS

6.† The president shall have general supervision over the affairs of the association. He shall preside at all meetings of the association and of the executive committee; shall appoint all committees not otherwise provided for, and shall be ex-officio mem-

† Amended October 17, 1940.
* Article adopted 1922.
** Amended September 20, 1948
‡ Amended September 21, 1957.
*** Amended September 15, 1965.

ber of all committees. He shall with the secretary sign all contracts or other written obligations of the association which have been approved by the executive committee. He shall render a detailed report at least three times during the year to the members of the executive committee, showing the financial condition of the association and its activities.

At the annual meeting the president shall present a report containing a statement of the general conditions of the association.

7. The vice-presidents in order of seniority shall preside at meetings in the absence of the president and discharge his duties in case of a vacancy in his office.

8.† It shall be the duty of the secretary to keep a correct record of the proceedings of all meetings of this association, and of all accounts, between this association and its members; to collect all moneys due the association, and deposit the same in the name of the association. He shall pay all bills when properly certified and approved by the president and the treasurer, and make such reports as may be called for by the executive committee. He shall also perform such other duties as the association may require.

9.‡ The treasurer shall have charge of the funds, check all deposits as made by the secretary, sign all checks after they have been approved by the president, and invest all funds not needed for current expenses as directed by the executive committee. He shall report at each annual meeting on the condition of the finances.

NOMINATING COMMITTEE

10.# After each annual meeting the president shall appoint a committee consisting of five members. Two Past Presidents shall be members of this committee, one of whom shall act as Chairman. No other officers of the Association shall be appointed to this committee. This committee shall prepare a list of names of nominees for officers to be voted on at the next annual convention in accordance with ARTICLE VI of the Constitution, said list to be read at the business session of said convention. Nothing in this section shall be construed to prevent any member making further nominations.

AUDITING COMMITTEE

11.‡ Prior to each annual meeting the president shall appoint a committee of three members, not officers of the association, whose duty it shall be to examine the accounts and vouchers of the secretary and the treasurer and certify as to the correctness of their accounts.

COMMITTEE ON SUBJECTS FOR DISCUSSION

12. After each annual meeting the president shall appoint a committee whose duty it shall be to prepare a list of subjects for investigation to be submitted for approval at the next convention.

COMMITTEE ON INVESTIGATION

13. After the association has adopted the list of subjects for investigation the president for the succeeding year shall appoint the committees who shall prepare the subjects for report and discussion. He may also appoint individual members to prepare reports on special subjects, or to report on any special or particular subject.

PUBLICATION COMMITTEE

14. After each annual meeting the executive committee shall appoint a publication committee consisting of three active members whose duty it shall be to cooperate with the secretary in the issuing of the publications of the association. The assignment of this committee shall be such that at least one member shall have served on the committee during the previous year.

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‡ Adopted October 17, 1940.
# Amended December 4, 1950.
† Amended September 20, 1948.
‡ Amended September 21, 1957.

ORDER OF BUSINESS

15.† Call to order by president.
Opening prayer or invocation.
President's address.
Report of secretary.
Report of treasurer.
Appointment of special committees.
Reports of standing committees and presentation of papers.
Unfinished business.
New business.
Election of officers.
Installation of officers.
Adjournment.

DECISIONS

16. The votes of a majority of the members present shall decide any questions. motion or resolution which shall be brought before the association, unless otherwise provided. Unless specifically provided herein otherwise, all discussions shall be governed by Robert's rules of order.

AMENDMENTS

17.† The By-Laws can be amended by a two-thirds vote of those present at any regularly called executive committee meeting.

† Amended September 20, 1948.

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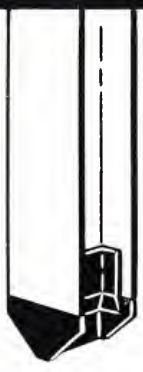

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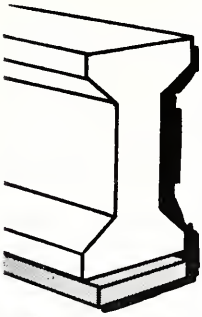
Curie, H. D.
Dick, M. H.
Dove, R. E.
Gunderson, R. R.
Howard, N. D.
Jorlett, J. A.
Mottier, C. H.
Winkelhaus, L. C.

LIFE MEMBERS

Anderson, Arthur
Baker, F. A.
Baker, R. C.
Barsema, M.
Beatty, A. C.
Beaver, J. F.
Beeder, R. H.
Bell, D. V.
Benson, O. C.
Beringer, M. A.
Billmeyer, E. D.
Bishop, D. B.
Bowman, R. M.
Bradfield, R. G.
Brice, W. T.
Buckmaster, W. A.
Budzenski, F. N.
Bunge, W. H.
Burch, E. E.
Burpee, C. M.
Carpenter, R. H.
Carter, J. W.
Celander, H. W.
Christianson, H. B.
Collier, P. B.
Colvin, A. A.
Cooper, S. A.
Cramer, F. H.
Crane, J. C.
Cross, E. T.
Cummins, C. P.
Davis, H. E.
Dixon, C. E.
Duchac, J. V.
Eargle, J. M.
Eichenlaub, C. M.
Elliott, C. E.
Enger, E. M.
Forseth, C. E.
Fort, O. E.
Fox, R. L.
Geyer, C. J.
Giles, J. M.
Harlow, H. M.
Harman, W. C.
Hawley, I. H.
Hedley, W. J.
Heinlen, R. H.
Hemstad, Birger
Hendrix, W. P.
Hickok, B. M.
Hillman, A. B.
Hogel, E. C.
Hornig, F. F.
Hoyt, A. C.
Hubbard, M. J.
Huffman, W. H.
Humphreys, R. W.
Hunter, A. L.
Hutcheson, F. W.
Hutcheson, W. A.
Jackson, T. E.
Jenkins, H. W.
Johnson, A. C.
Johnson, B. O.
Johnson, E. A.
Johnson, H. T.
Kahl, F. B.
Kemmerer, W. G.
Kendal, J. T.
Kieckers, E. W.
Koehler, P. L.
Krefting, A. S.
Kvenberg, S. E.
Leach, A. L.
Linn, G. A.
Little, H. C.
Lokotzke, G. P.
Lord, H. L.
Lowry, J. M.
Lucas, H. F.
Lund, C. V.
Mabry, D. B.
McGrew, F. O.
McKibben, D. H.
Manley, B. F.
Martens, W. F.
Martin, J. W.
Meeks, W. R.
Merrill, B. W.
Messman, D. V.
Meyers, B. R.
Moore, I. A.
Morgan, C. E.
Moris, R. F.
Nichols, J. C.
Oest, W. C.
Ostrom, W. D.
Packard, B. G.
Pahl, W. H., Jr.
Patterson, C. C.
Patterson, J. M.
Pearson, A. H.
Perrier, J. L.
Peterson, N. E.
Podas, N. F.
Pritchard, B. L.
Prude, G. F.
Raessler, V. D.
Rainey, W. H.
Rapier, L. F.
Raver, H. E.
Robinson, G. E.
Robinson, N. R.
Rothell, R. D.
Safley, J. R.
Salmon, J. M., Jr.
Sathre, C. O.
Saunders, T. D.
Seley, L. L.
Shamblin, R. E.
Short, W. L.
Simonson, E. F.
Singer, E. W.
Slagle, G. P.
Smith, C. E.



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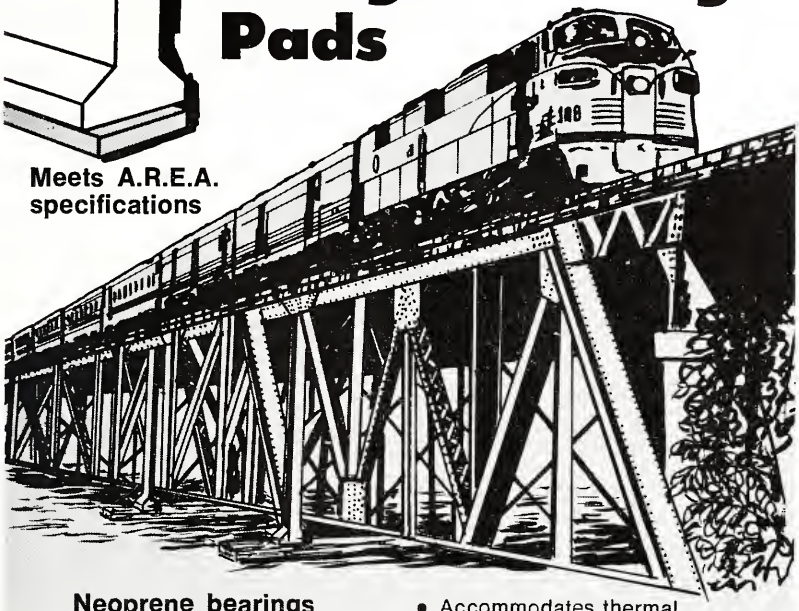

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Taylor, W. L.
Tetrault, L. J.
Thelander, P. V.
Throckmorton, W. B.
Tourtellotte, E. B.
Trulove, J. D.
Tucker, N. R.
Tyckoson, E. G.
Von Behren, G.
Wachter, C. E.
Wall, R.
Wang, A. B.
Warfield, H., Jr.
Warfield, W. B.
Weller, M. E.
White, L. H.
White, S.
Whitehouse, B. M.
Williams, C. B.
Williamson, H. M.
Wingerson, C.
Wohlschlaeger, M. A.
Wood, R. E.
Woolford, F. R.
Yaw, D. W.
Zapfe, E. J.

ALPHABETICAL LIST OF ALL MEMBERS

M Indicates Member
A " Associate Member
J " Junior Member
L " Life Member
H " Honorary Member

(Figures following name indicate year in which membership became effective)

A

Abbott, E. L. (A'69), Sales Engr., General Railway Signal Co., 2120 Prudential Plaza, Chicago, Ill. 60601
Acker, H. E. (M'71), Asst. Gen. Br. Insp., C.&N.W., Chicago, Ill. 60606
Acs, J. S. (M'71), Proj. Engr., Chessie, Riverdale, Ill. 60627
Adams, L. J. (M'65), B.&B. Supvr., U.P., Pocatello, Ida. 83201
Alexander, J. F. III (M'74), B.&B. Supvr., Sou., Homewood, Ala. 35209
Alley, F. T. (M'55), Engr. Br., S.P., Houston, Tex. 77035
Anderson, A. (M'47, L'60), Ret. Engr. Gr. Cross., N.Y.C., Rosemont Route, Box 56, Colorado Springs, Colo. 80903
Anderson, D. L. (M'74), Designer, I.C.G., Chicago, Ill. 60601
Anderson, H. E. (A'74), Mgr. Oper., Osmose Company, 4915 Monona Dr., Madison, Wis. 53716
Anderson, L. E. (M'70), Asst. B.&B. Supvr., S.P., Eugene, Ore. 97405
Anderson, R. D. (A'67), Consultant, L. B. Foster Co., 140 Brightwood Ave., Westfield, N.J. 07090
Andrews, D. J. (M'69), Supvr. B.&B., C.&N.W., Green Bay, Wis. 54303
Anthony, O. D. (M'71), Asst. Ch. Engr.-Br. & Str., B.&A., Bangor, Me. 04401
Armstrong, W. F. (M'47), Engr. Bldgs., C.&N.W., Chicago, Ill. 60606
Arnold, L. K. (M'62), Asst. Gen. Fore. B.&B.-W.S., A.T.&S.F., San Bernardino, Calif. 92407
Aust, J. K. (M'74), Asst. Dir. Constr. Proj., B.N., Lincoln, Nebr. 68520
Autrey, W. S. (M'71), Ch. Engr. Sys., A.T.&S.F., Chicago, Ill. 60604

B

Badaukis, C. T., Jr. (M'72), Mech. Engr. Tech., I.C.G., Chicago, Ill. 60605
Baker, F. A. (M'55, L'70), Ret. Gen. Br. Insp., S.P., 2507 Polk St., Eugene, Ore. 97405
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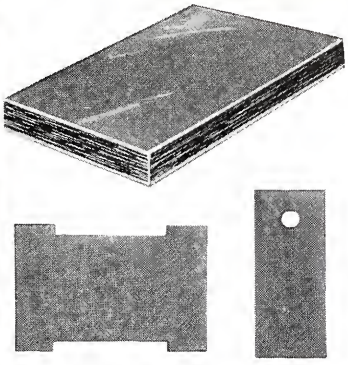
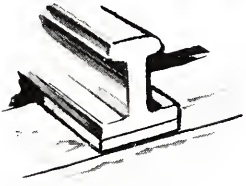
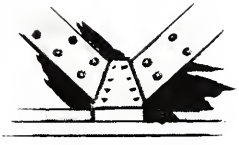


Bridges



Railroads



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Barr, A. S. (M'66), Ch. Reg. Engr., P.C., Pittsburgh, Pa. 15222
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Bartley, C. W. (M'66), B.&B. Supvr., B.N., Glendive, Mont. 59330
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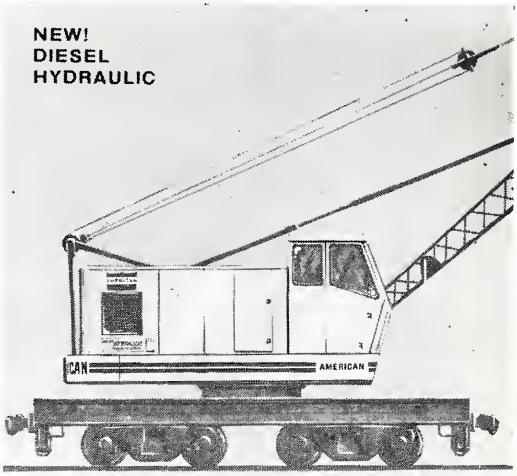

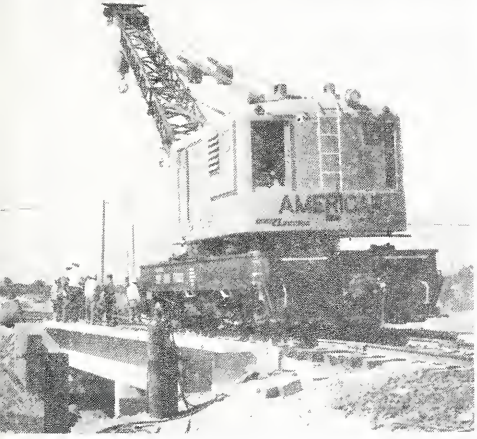

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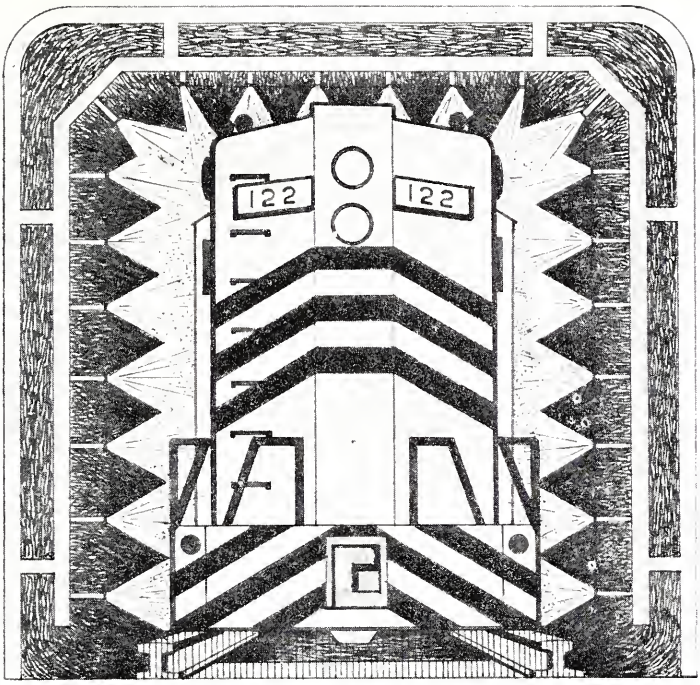

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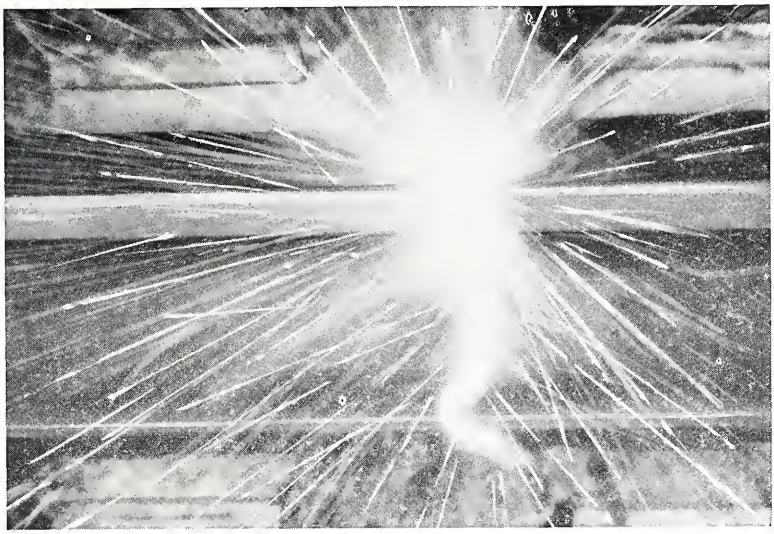

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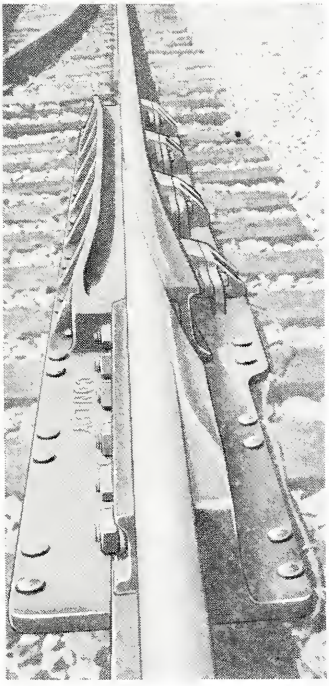

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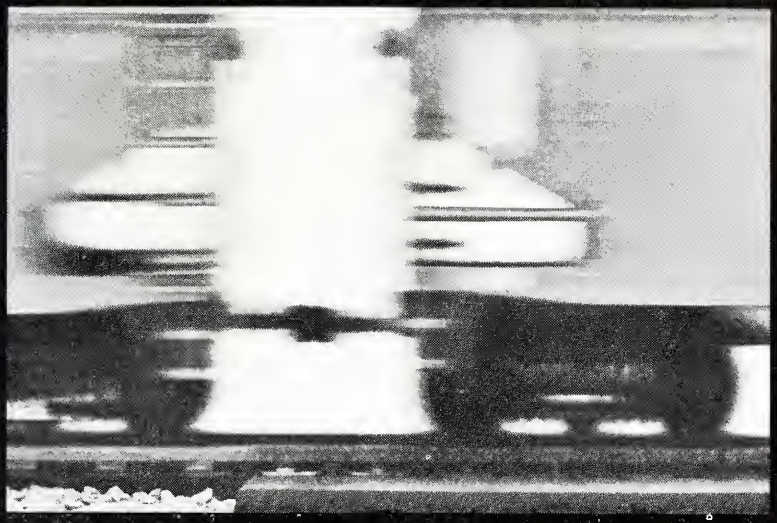

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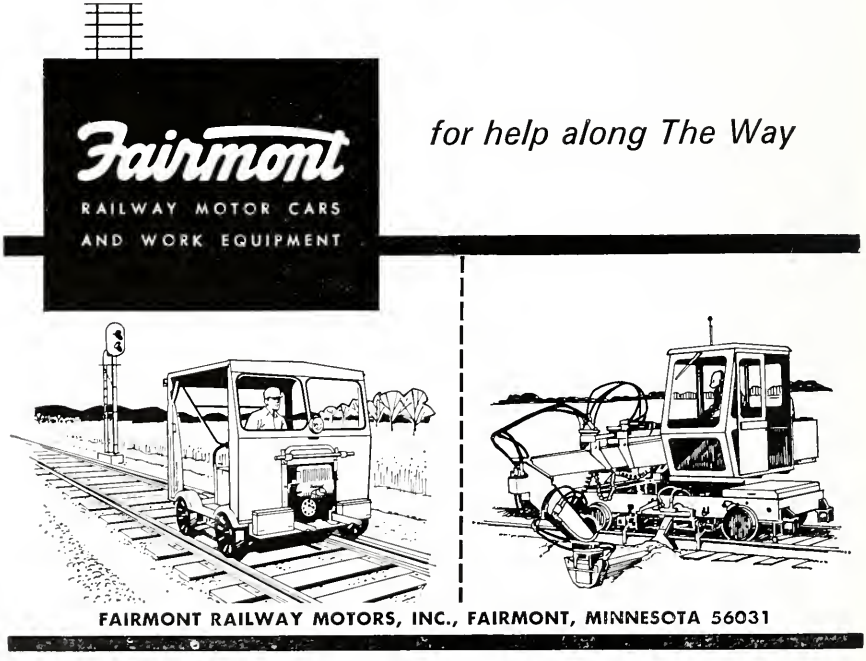

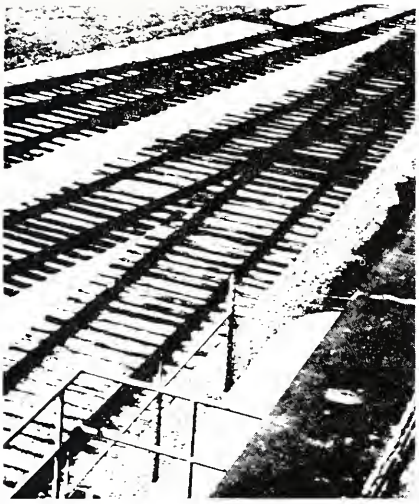

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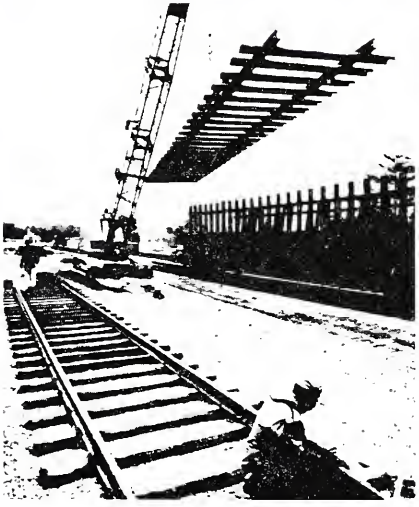

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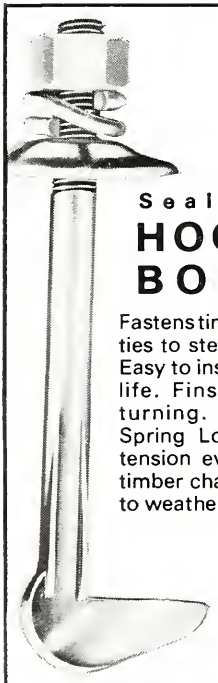

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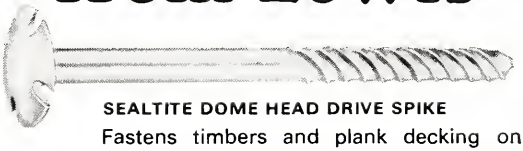

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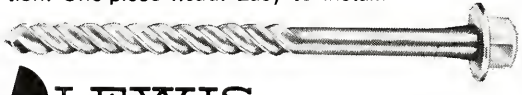

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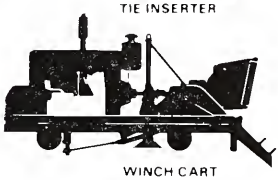

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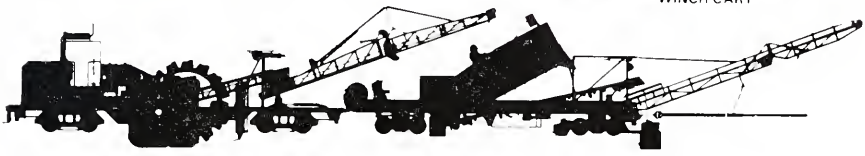

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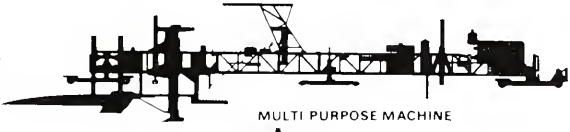

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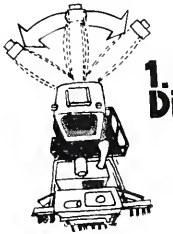

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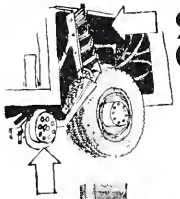

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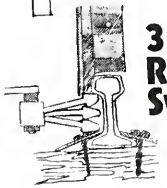

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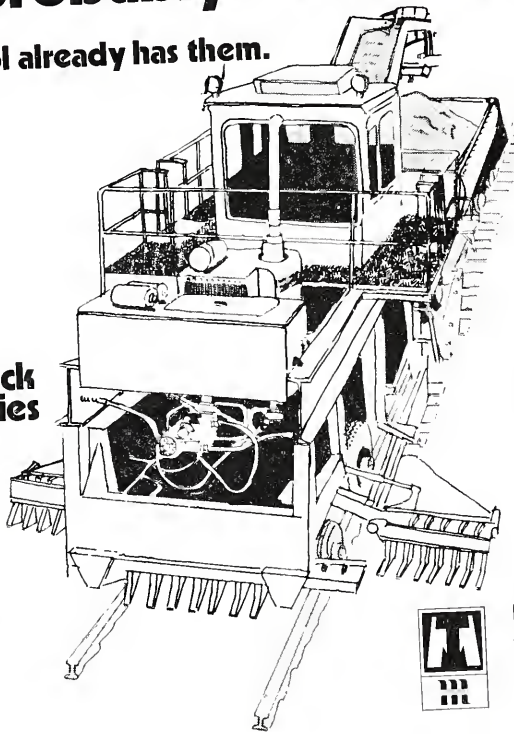

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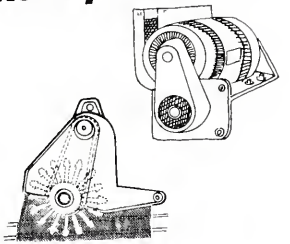

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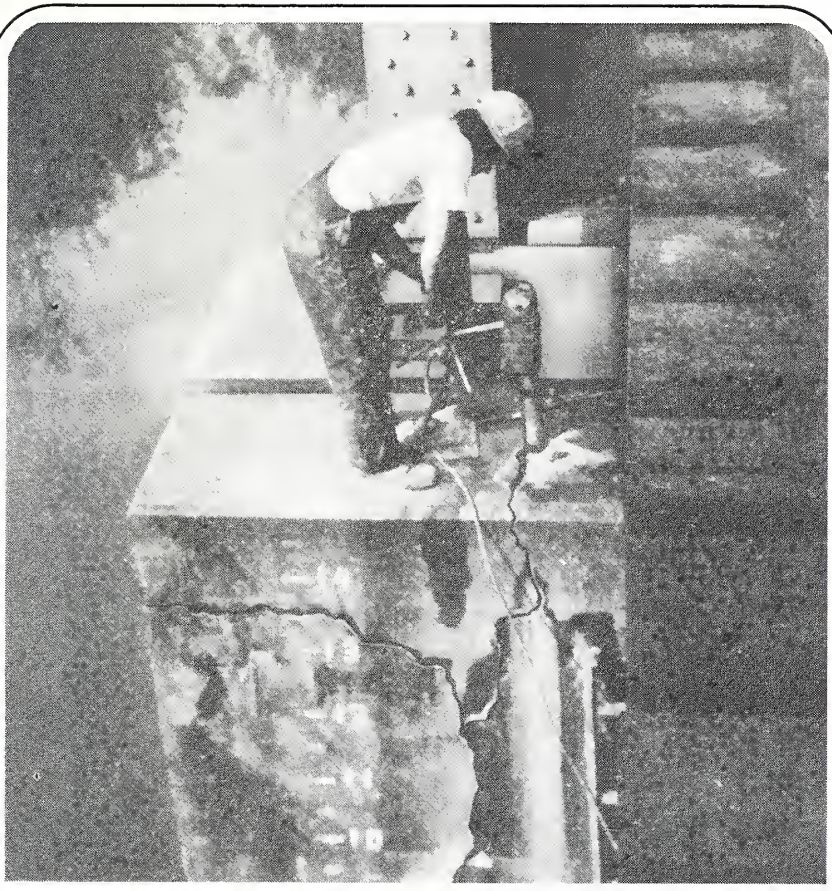

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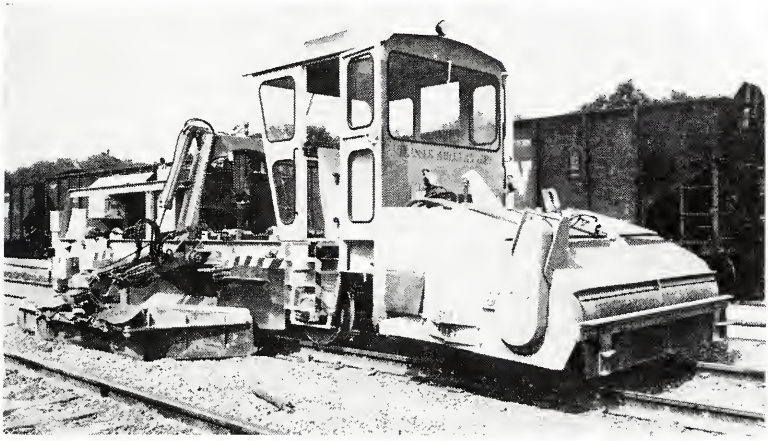

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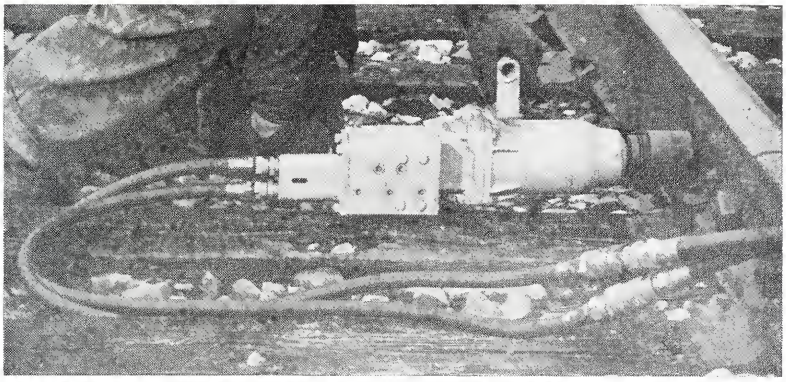

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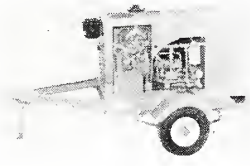

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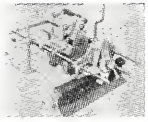

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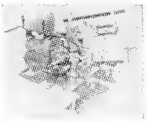

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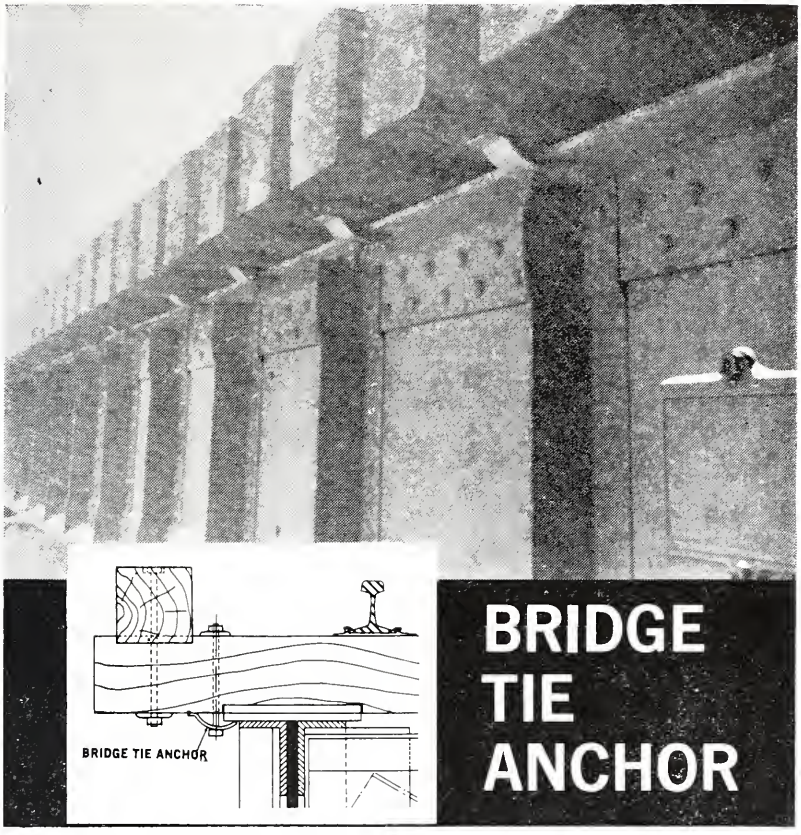

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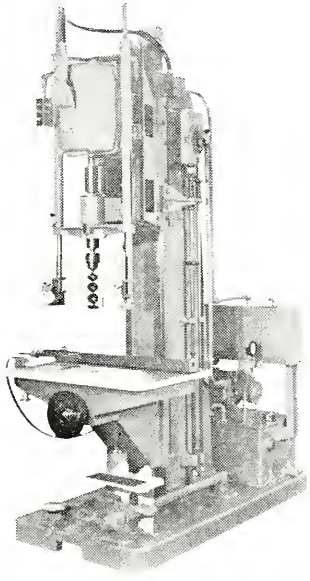

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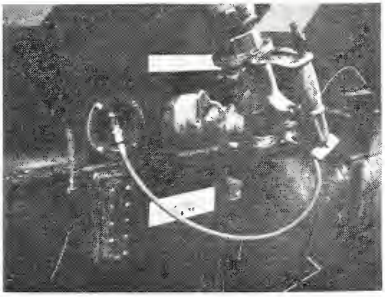
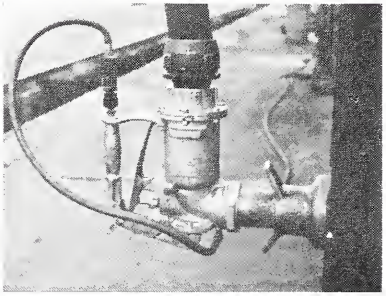


Close-Up of Snyder OPW 1620-DS Automatic Nozzle in operation, with Snyder No. 565 Quarter Turn Fuel Quick Coupling Adapter, connected to Standard Diesel Fuel Tank. Fill Adaptor.



Close-Up of Snyder OPW 1620-DS Automatic Nozzle secured, with Snyder No. 565 Quick Coupling Fuel Adaptor to No. 104-S Fuel Crane.

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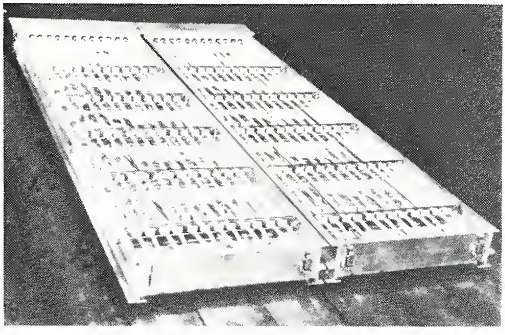

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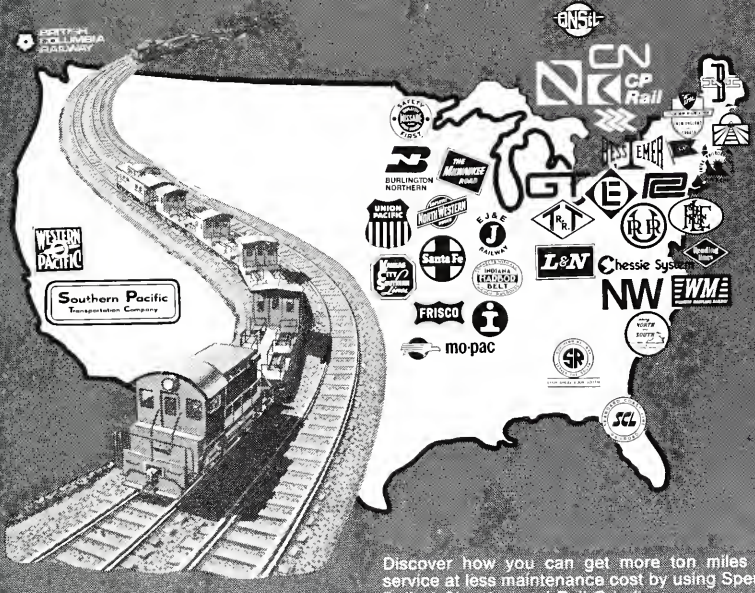

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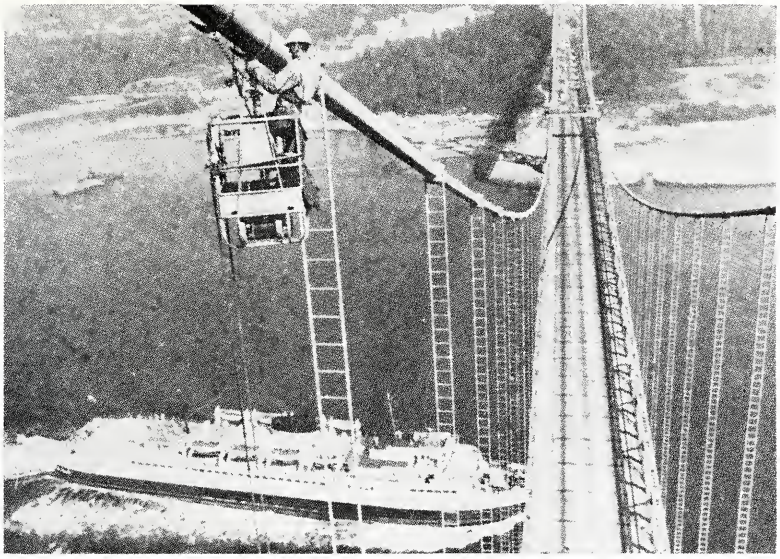

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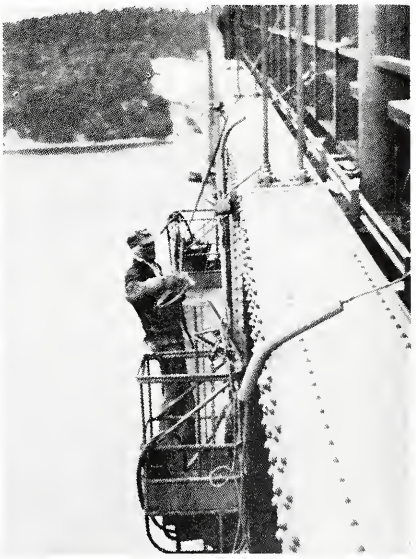

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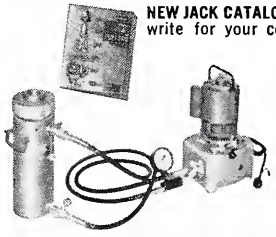

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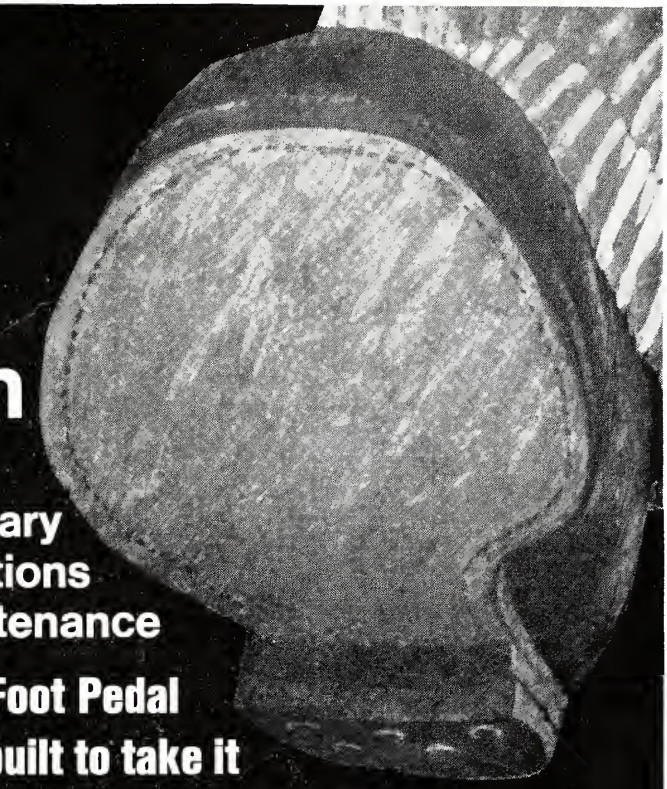

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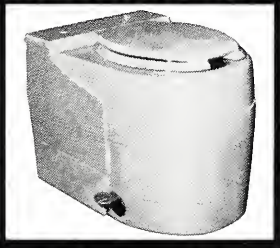

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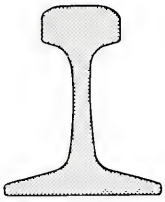

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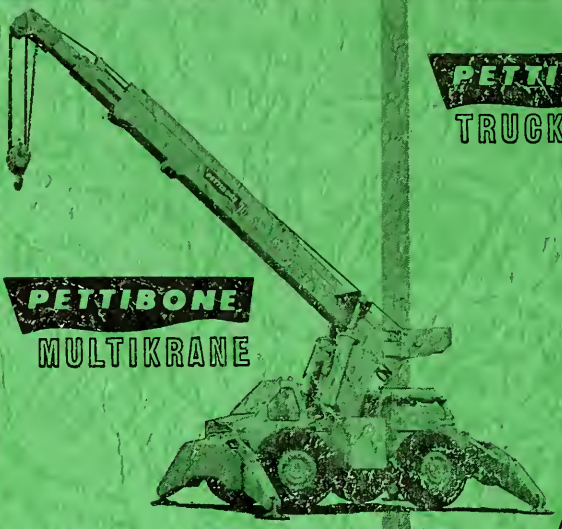

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